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Samuel F. Hildebrand

Samuel Frederick Hildebrand

August 15, 1883—March 16, 1949

An Appreciation

Sam Hildebrand was one of the best and truest friends I ever had or expect to have, substantial, straightforward and sincere, genial, friendly, and to a fault generous of his time and substance whenever his help or advice was sought, no matter what the need. Richly endowed with a keen, dry sense of humor and an abundance of good common horse sense, he was staunchly but unobtrusively independent in thought and deed. He was a broadminded liberal of surpassing understanding, with an abiding faith in God and the higher destiny of man. From the day he was first introduced to a scientific collection of fishes by the late Seth E. Meek, he devoted himself with great singleness of purpose to the study of fishes. With a talent for biology and systematics, he became one of the world's leading ichthyologists. There was never a man happier in his chosen field of work, his church, and his family.

Waldo L. Schmitt

Samuel Frederick Hildebrand

By Leonard P. Schultz[1]

IT WAS my good fortune to know Dr. Samuel F. Hildebrand for more than 12 years and to work in the same offices and laboratory with him since August 15, 1942, when he moved into the Division of Fishes, U. S. National Museum. He was an outstanding ichthyologist and a fine Christian gentleman. His sudden death on March 16, after a full day of work at his desk, came as a shock but not as a surprise, for his heart had been giving him trouble. He was addressing the Young Adult Class of his Sunday School when the end came.

During the past several years Dr. Hildebrand, along with the others in the Division of Fishes, gathered around a table each noon to eat lunch, and often again late in the afternoon to have coffee. This association across the table led to close acquaintance and the most cordial relationships. We were like a big family and there were few subjects that we did not discuss. Through stories of his early associations, we became familiar with the personalities of some of the late ichthyologists, particularly Seth Eugene Meek, Barton Warren Evermann, Carl H. Eigenmann, Hugh M. Smith, H. Walton Clark, Barton A. Bean and William C. Kendall (Dr. Hildebrand has written unpublished accounts of the personalities of a few of these men). Our luncheon hour was a pleasure because our good friend sat at the head of the table.

He took great pleasure in his family, and could hardly wait for the weekend visits of his 3 grandchildren. His hobbies were bible study and his garden. We compared our products at lunch time and although I excelled him on size of tomatoes one year, he always had the longest stringbeans.

Dr. Hildebrand's parents, Herman Henry Hildebrand and Sophia Weitkamp, were born and reared in Latbergen near Munster, Prussia, where they were married and lived for several years. Life was hard for them as farmers and toward the end of the "Civil War" they came to the United States with their two daughters, settling near a Methodist Church known as "Midway," between Huntingburg and Holland, Indiana. After 3 years of tenant farming his father bought a farm in the backwoods 2 miles from the little village of Zoar, consisting of a Methodist Church and a store. Here his parents lived, and brought forth 10 more children, 2 of whom died in infancy. Samuel, the youngest, with the other sons and daughters, spent his boyhood days on the farm, doing chores before and after school, and on Saturdays working all day in the fields. In those days children were great assets as farm hands and, as was the custom, all money earned was turned over to the father until the age of 21 was reached. Living in a German community, neither parent ever learned to speak English. As a result Dr. Hildebrand spoke German fluently.

Since the Hildebrands were brought up as strict Methodists, the local church greatly influenced him, and this religious training carried through all of his years. He attended his first country school in 1888, doing excellent work and showing more than usual ability in "reading, writing and arithmetic."

[1] I wish to express my sincere appreciation to Mrs. S. F. Hildebrand, for making available much of the information in this biography and for the loan of photographs.

He made the highest grade in Pike County in examinations when he graduated in the spring of 1900. Along with 3 brothers and one sister Samuel taught school successfully; the Hildebrands were known as "born teachers." During 1901, after helping on the farm for the past year, young Hildebrand decided to go back to school. He attended the spring normal school session at Stendal, walking 3 miles night and morning during that winter. Upon passing his

Fig. 1. During early college days, 1905.

teacher's examinations he taught from 1902 to 1905, the last year in the Pikeville School. He often remarked that his mind worked slowly but when given ample time for thought and expression he could come through in fine shape. He said of himself that he was a plodder; this, with his ability to reason and his retentive memory, made him a success in his chosen field.

One of his professors at Stendal, Mr. Royalty, was a deeply religious man who exerted much influence on Samuel to become a minister. His decision was to wait until he had acquired more education, contrary to the opinion of his

minister. Thus, at the time he was about ready to enter the Indiana State Normal School, now Indiana State Teachers College, in the spring of 1905, the minister made a speech about one fine young man (Fig. 1) who had gone wrong. By working his way at various jobs, including tutoring in German, he stayed through to graduate in June, 1908. He intended to remain to complete his A.B. degree but Dr. Seth E. Meek, ichthyologist of the Field Museum of Natural History in Chicago, was looking for an assistant. Prof. U. O. Cox, himself a minor figure in ichthyology, thought it an opportunity for Samuel and accordingly he left Terre Haute, Indiana, at the end of the spring term in 1908.

Late in the summer of 1908 Hildebrand began working for Meek and continued to do so until 1910 when he returned to Terre Haute, in April, to work out required courses, and thus graduated with the A.B. degree in June, aided by credits earned at the University of Chicago. Under Dr. Meek, Samuel began to study fishes in earnest and also became familiar with reptiles. Their catalogue of the fishes occurring within 50 miles of Chicago, published in 1910, was his first paper.

During graduation week Dr. Barton W. Evermann, Chief of the Division of Scientific Inquiry, U. S. Bureau of Fisheries, gave a lecture, and Hildebrand was introduced to him by Prof. Cox. Dr. Evermann urged him to take the U. S. Civil Service examination and on October 1, 1910 Hildebrand began working for him as Scientific Assistant in Washington, D.C. That December, under the auspices of the Smithsonian Institution, he sailed with Meek for Panama, to aid in a biological survey of the Canal Zone. There they worked "like mad," for Meek never did things by halves. The 8 barrels of fishes they collected were later unpacked and sorted by Hildebrand in Washington. He interrupted this work to marry Miss Claudia Chaillaux to whom he had been engaged since about 1907, on August 10, 1911.

The next January, Meek and Hildebrand again sailed for Panama, but after about 3 months Meek was worn out and his able assistant packed up for the return trip. Back in Washington in May, Hildebrand was in time for the arrival of his first daughter, Louise, born June 12, 1912. That summer Meek came to Washington to study the now 16 barrels of Panama fishes, and they worked long and hard sorting them. In the autumn Meek developed a cough, caused by a heart ailment, which grew progressively worse, and he returned home to Chicago, never again studying the Panama fishes. He died on July 6, 1914. Hildebrand worked on the Panama report until the spring of 1914, when he was appointed Director, U.S. Fisheries Biological Station, Beaufort, North Carolina. Thus, until 1921 he was able to work on the Panama fishes only during the winter months, except 1914–15 and 1919–1920. The winter of 1915–16 was spent at Indiana University with Prof. Carl H. Eigenmann, who was the specialist on South American fishes and had an excellent library. A year's graduate credit was thus earned. The first volume of the freshwater fishes of Panama was published December 28, 1916. The 3 volumes dealing with the marine fishes appeared in 1923, 1925 and 1928. Although Hildebrand's name appears as junior author on all those splendid volumes, Meek wrote no part of them. Hildebrand loyally carried out the terms of the original

agreement because Meek had been a true and tried friend who started him out in ichthyology.

During the directorship at the Beaufort Biological Station from April, 1914, to November, 1917, Hildebrand devoted his attention to studies of the life histories of fishes, which resulted in several publications. When the Navy took over the station, the Hildebrands returned to Washington, where the second daughter, Harriett, was born on February 17, 1918. Very soon he was sent to Augusta, Georgia, to work out the usefulness of the top minnow, *Gambusia,* for mosquito control near Camp Hancock. Near the end of the summer a severe influenza epidemic broke out and Hildebrand, along with others in the Public Health work, abandoned regular duties to devote full time to care for the sick. On November 8, 1918, he returned to Washington, and was soon appointed Director of the U.S. Fisheries Biological Station at Key West, Florida, where he spent 15 months. During November, 1919, they experienced one of the worst hurricanes to visit Key West and the station was severely damaged. Hildebrand's often repeated account of this incident somewhat illustrates his sense of humor: "It is characteristic of Key West, that the only local account published to my knowledge was a brief paragraph in the Miami Herald that little damage was done; whereas hardly a building was undamaged that had not washed away, not a boat was undamaged, and several hundred people were drowned."

From the summer of 1920 to 1924, Hildebrand worked for the U.S. Public Health Service at a position of increased pay with the title of advisor and investigator. During 1920 he traveled widely in the southern states, but made his home and headquarters at Washington, where Samuel Jr. was born on April 1, 1923. During this period *Gambusia* was studied experimentally in the south and extensively in the laboratory, resulting in several excellent papers on its relation to mosquito control.

One month of the winter of 1924 was spent in El Salvador with the late Fred J. Foster, a fish culturist of the Bureau of Fisheries, and a few days each in Guatemala, Honduras and Nicaragua. The fishes collected were reported upon in 1925.

Dr. Hildebrand was reappointed Director of the Beaufort Station early in 1925, and that spring an invitation was received from the Public Health Department, School of Medicine, University of Georgia; Augusta, to visit the school for 2 weeks to give lectures on mosquito and malaria control. By this time he had become so well known for his excellent experimental work on this subject that this University granted him the degree of "Doctor of Public Health." The diploma was received that June by mail because he avoided and disliked formalities. He devoted much of the time that could be spared from his administrative duties at Beaufort to the early life history of fishes, and with the aid of Miss Louella Cable, as illustrator and co-author, published papers on this topic that have not been equalled in this country. Much attention also was given to the experimental study of diamond-back terrapin culture, and the results of these studies have appeared in several papers.

Beaufort was a wonderful place in which to live, but he decided that he would rather do research on fishes than remain in an administrative position. He thus turned down offers as Chief, Division of Scientific Inquiry, Bureau

of Fisheries, and Curator of Fishes at Stanford University. As a result he produced several outstanding contributions by which he will be remembered, whereas many administrators are soon forgotten. He was certain that he lived years longer by being relieved of administrative work.

Dr. Hildebrand remained at Beaufort from July 1, 1925, to June 30, 1931, when he returned to Washington, as senior ichthyologist, Bureau of Fisheries. He was promised by his chiefs a free hand in planning and carrying on his own research, and although he was very skeptical of these promises they held remarkably well, except for occasional tours of duty. In Mississippi, in 1933, he advised a new Fish and Game Commission in regard to conservation and fishing regulations; the advice was subsequently adopted almost fully by the State. Again in February, 1934, he sailed to Puerto Rico to determine the suitability of certain mountain streams for trout.

In February, 1935, he sailed for Panama at the invitation of Dr. Herbert C. Clark, Gorgas Memorial Laboratory, Panama City. He collected in the Gatun Locks, and Gatun Lake, and vicinity, and visited Chiriqui Viejo Valley, western Panama, to check on the trout planted there when he and Mr. Foster were in that region in 1924. Marine fishes were collected near Panama City and the Pearl Islands. A second trip in 1937 to Panama, again at the invitation of Dr. Clark, resulted in more fish collections. The study of that material, along with additional specimens in the National Museum, resulted in the appearance of a new catalogue of the freshwater fishes of Panama, published in 1938.

Three other major tasks came up about this time that delayed the new catalogue of the marine fishes of Panama and as a result this project was only two-thirds completed when he suddenly died on March 16, 1949, after a full day of work on Panama fishes at the National Museum.

During 1935 Hildebrand began his revision of the American anchovies, a very difficult group of fishes. The revision was printed in 1943. Fully a year was spent in completing the manuscript of Dr. William H. Longley, Goucher College and Carnegie Institution of Washington, on the fishes of Tortugas, Florida, shortly after Longley's death in 1937. This was a trying undertaking, but the two published papers are valuable contributions to ichthyology. The period from September, 1942, to late 1944 was devoted to the preparation of *The Shore Fishes of Peru*, a monumental work useful both for laymen and ichthyologists, published in 1946.

In recognition of Hildebrand's long and useful career, the U.S. Department of the Interior honored him with a posthumous AWARD FOR DISTINGUISHED SERVICE. This honor was received by Mrs. Hildebrand in an impressive service on August 30, 1949.

Hildebrand was a good systematist and conservative in his attitude toward unnecessary scientific name changes, which he felt contributed to instability in nomenclature. He used modern equipment, including binocular microscopical instruments and precision measuring devices. His working methods were of the "new school"; he was accurate, precise, and logical in his observations and conclusions. He, too, made mistakes but he never claimed to be a perfectionist. His memory was good and he knew the American literature on

fishes very well. He had a great wealth of information on American fishes that ably served the U.S. Fish and Wildlife Service. Many visitors came to him, to obtain practical information about fishes (Fig. 2).

Fig. 2. Taken in August, 1943, one year after moving into the Division of Fishes. Photograph by the author.

In conclusion, Dr. Samuel F. Hildebrand will be remembered as a true friend, and an excellent ichthyologist who studied fish as living animals. He possessed in a rich measure mental and spiritual qualities that inspired his associates with respect, love, and admiration.

U. S. National Museum, Washington, D. C.

Samuel F. Hildebrand as a Government Scientist

By Elmer Higgins[1]

THE thirty-nine year career of Samuel F. Hildebrand as a scientist employed by the United States Government was characterized by four chief lines of endeavor. The first, interrupted only temporarily throughout the entire period of his service, was the study of systematic ichthyology, and although he made significant contributions in other fields of biology his work in systematics will long endure. The second line of interest, which he developed in earlier years and which brought him well-deserved acclaim, was his study of fishes in relation to mosquito control. These studies contributed materially, during the first World War and in the following years, to the successful campaign for the control of malaria throughout the southern states and in many foreign lands. The third field of interest, in which he worked for several years, was the study of the embryology and life history of marine fishes of the South Atlantic Coast. The fourth and minor one was his continuing interest and studies in terrapin culture at Beaufort, North Carolina—that is, the development of means and methods of hatching and growing in captivity the valuable diamond-backed terrapin of the southern coastal area.

Historically Dr. Hildebrand's career in government service may be divided into periods corresponding to his formal appointments. He entered the U. S. Bureau of Fisheries and served from 1910 to 1914 as Scientific Assistant (the title then used for research positions), with headquarters in Washington. During this time, he was engaged chiefly in field investigations for he was detailed to participate in the Smithsonian Biological Survey of the Panama Canal Zone during 1910–1912, assisting Dr. S. E. Meek in studies of the fish fauna.

From 1914 to 1918, Dr. Hildebrand served as Superintendent and Director of the U. S. Fisheries Biological Station at Beaufort, North Carolina, where he completed the work on the fresh-water fishes of Panama and started studies on terrapin culture which were to continue under his general supervision for nearly 20 years. During this period, Dr. Hildebrand became interested in the possibilities of using surface-feeding top-minnows in the fresh waters of the south for the control of malaria-bearing mosquitoes. During the first World War, he was assigned to the Sanitary Force of the U. S. Public Health Service engaged in malaria control in the extra-cantonment area of Camp Hancock, Georgia.

Serving during 1918–1919 as Director of the newly established U. S. Fishery Biological Laboratory, Key West, Florida, he continued studies of the local fish fauna and further field studies on malaria control.

In 1919 Dr. Hildebrand was appointed ichthyologist for the Bureau of Fisheries and was again stationed in Washington. The next 6 years must have been a busy period of activity for he spent long field trips visiting twelve of the southern states, conducting studies and demonstrations for public health officials in methods of mosquito control by means of fish, and worked for considerable periods of time at the Public Health Service Headquarters, Augusta, Georgia, on experimental studies in his field.

[1] Editor's Note: Mr. Higgins, of the U. S. Fish and Wildlife Service, was closely associated with Dr. Hildebrand during the last twenty-five years of the latter's service.

He also started, with William C. Schroeder, an exhaustive study of the fish fauna of Chesapeake Bay, utilizing material collected largely by the fishery steamer "Fish Hawk" in its survey during 1920–1922. During January and February of 1924, he visited El Salvador in Central America and made extensive studies in the fresh-water areas of that Republic.

During these and succeeding years he also found time to complete and carry to publication, in 1923, 1925 and 1928, the three volume work on the "Marine Fishes of Panama" in co-authorship with Meek, who had died more than 10 years before.

In 1925, Dr. Hildebrand was again appointed Superintendent and Director of the Fisheries Biological Station at Beaufort, North Carolina, where he served until 1931. This service involved a considerable amount of administrative duty for the laboratory was soon repaired and modernized, a residence and a terrapin culture house were built, a 46-foot yacht was added to the fleet of small boats serving the station, and the laboratories were again opened to private investigators engaged in studies of marine biology. The permanent scientific staff of the station was increased during the early years of Dr. Hildebrand's directorship and several staff members of the Bureau's Division of Scientific Inquiry were detailed to the station for research work for varying periods of time. A government mess for the entire staff was operated over which Dr. Hildebrand presided daily with good-humored and benign authority. During the following years, the station's facilities, maintained in excellent condition under Dr. Hildebrand's supervision by the veteran foreman, Charles Hatsell, were utilized to an increasing extent by Bureau staff members and by visiting private investigators.

During this period of directing the activities of a marine biological laboratory located where a delightful climate and beautiful surroundings invited participation in swimming, fishing and other outdoor sports, Dr. Hildebrand permitted neither administrative routine nor pleasant diversions to interfere with his prosecution of serious scientific studies. Day by day from 8 to 5, he was always at his desk or at his laboratory table. Relaxation with his family, the station's guests or with his neighbors in Beaufort was enjoyed only after office hours and during week-ends.

At Beaufort, he took active part in further studies on the propagation of terrapin, and the entire mass of data accumulated since 1914 was analyzed and prepared for publication. He also began the studies of the embryology, early development and life histories of a considerable number of shore fishes of the region, in which he was later assisted by Louella E. Cable as illustrator and collaborator. He completed with W. C. Schroeder a study on the fishes of Chesapeake Bay which was published by the Bureau in 1928.

Dr. Hildebrand began what may be characterized as the more mature period of his scientific work when he was relieved in 1931 from the administration of the Beaufort Laboratory and returned to Washington as Senior Ichthyologist for the Bureau of Fisheries, in which position he continued under the Fish and Wildlife Service, successor to the Bureau, until his death.

For the first 9 years on this assignment, his work was comfortably housed along with the extensive Bureau collections of fish, not yet transferred to the National Museum, in laboratories on the basement floor of the Commerce De-

partment building. Later, for a period of 2 or 3 years, he worked under difficulties in temporary quarters occupied by the Bureau in two different office buildings in Washington and finally was established in comfortable office space in the Division of Fishes of the National Museum, where the Bureau's collection was consolidated with the Smithsonian collection.

In 1933, he conducted a survey of fishes of the State of Mississippi. In 1934, he studied fish cultural possibilities and made extensive collections of fishes in Puerto Rico. In 1935, he made brief surveys of the fishes of Silver Springs, Florida, and Lake Mattamuskeet, North Carolina. In that year, also, he completed examination of a collection of fishes from east Texas. In 1935, and again in 1937, he visited the Panama Canal Zone for the primary purpose of studying the Canal as a means of communication between the fish faunas of the Pacific and Atlantic Oceans. In addition to this, however, he made extensive collections of fishes in Panama and completed a "New Catalogue of the Fresh Water Fishes of Panama" in 1938. In 1936, he began an extensive review and revision of the anchovies of America and in 1937 began what proved to be a most difficult task but one which he completed with outstanding success. This was the revision and editing of the lifetime notes of the late Dr. William H. Longley of the Carnegie Institution on the fishes of Tortugas, Florida. Although senior authorship of the report properly was credited to Dr. Longley, Hildebrand contributed a great amount of original material and prepared the entire manuscript for publication.

In 1944, Dr. Hildebrand began a major task which remained unfinished at his death—the preparation of a supplement to the marine fishes of Panama. This work occupied his chief attention for a year or two, but was laid aside in 1946 for active work on a project undertaken by a group of ichthyologists—the preparation of a comprehensive account of all available information on the fishes of the western North Atlantic. This major work of a dozen or more volumes is to be published by the Sears Foundation of Yale University and Dr. Hildebrand participated with the editorial committee in planning the work. He was assigned a major section, the herrings and the herringlike fishes, and he completed the accounts of the families Engraulidae, Albulidae, and Elopidae before undertaking work on the principal family Clupeidae, which was finished in 1948. Since "The Fishes of the Western North Atlantic" is to consist of a review of all published literature on the fishes of this area, the preparation of the account of the herring fishes involved extensive revision and additions such as descriptions of new species discovered in the course of the work, all of which are to be published elsewhere.

Both before, during, and after the War, Dr. Hildebrand was called upon to perform miscellaneous duties based on his wide knowledge of fishes. The Federal Trade Commission, Tariff Commission and the Food and Drug Administration as an aid to trade practices occasionally requested expert opinion on proper nomenclature or identification of fishes and fish products which enter trade in the United States either from a domestic source or by import. Dr. Hildebrand also furnished the Navy Department with information on poisonous fishes and on sounds produced by fish, the latter as an aid in submarine detection. During the last several years of his work, Dr. Hildebrand was ably assisted by Jane Roller, Mrs. Nancy Patton and Mrs. Ann S. Green, who

made many illustrations, prepared records, catalogues and bibliographies, and kept files in order.

At the time of his death, there was of course a quantity of uncompleted work in his files, but because of his methodical habits and his meticulous care in completing each day's work, these files do not represent a confusion of miscellaneous notes and unorganized and unrelated observations of no value to any but their author. Although they will lack the touch of the master, the fragments may be assembled with a minimum of effort for future publication.

As a government employee in a Bureau primarily concerned with the more practical aspects of fishery research and fishery management, Dr. Hildebrand was called upon, because of his wide knowledge and experience, to perform many tasks outside his chosen field of science. Many of these were of temporary interest and some were trivial but regardless of the assignment, he completed each task thoroughly, skilfully and promptly. For example, although no expert in Federal personnel administration, he labored long with the Civil Service Commission as the Fisheries member of a departmental committee in devising a rational classification of the various positions and duties of Bureau personnel. This work was confirmed in the first Federal classification law, the Classification Act of 1923, and resulted in raising the salaries of many of his underpaid fellow employees.

Dr. Hildebrand was always co-operative and helpful to his associates. He always maintained his dignity as a man and his integrity as a scientist. I well remember an example of his resistance to "bureaucratic domination" when, as an inexperienced administrative officer about 1927, I issued official instructions to him at Beaufort on some personnel action beginning (in traditional governmentese), "You are hereby directed to . . . ." Back came a long-hand letter saying, "Never, in all my long years of government service, have I received such an arbitrary or dogmatic letter . . . ." In a personal conversation soon after, the misunderstanding was promptly cleared up and the instructions then were faithfully and effectively carried out.

In administrative matters, he was meticulous in meeting all requirements, including deadlines of completion. His station accounts were always in order. His routine reports were informative and invariably useful. His professional opinions on such matters as appropriate nomenclature, identification of small collections or individual specimens or on other technical matters, however small, were always authoritative. He was ever on the job despite the symptoms of the heart ailment that led to his death and prevented, after his last trip to Panama in 1937, his active participation in the field work he liked so well. Regardless of the distractions of official correspondence and administrative odd jobs that inevitably came his way, I believe that no weekday ever passed in which Dr. Hildebrand failed to make progress on his scientific enterprise by recording some carefully observed or painstakingly determined fact. And recorded facts, after all, are the most nearly imperishable product of man's activities. This determination to persevere toward a well-chosen goal, which was a guiding principle in Dr. Hildebrand's scientific work, is a measure of any man's greatness.

U. S. Fish and Wildlife Service, Washington 25, D. C.

Samuel F. Hildebrand, Ichthyologist and Herpetologist[1]

By Carl L. Hubbs

SAMUEL F. Hildebrand devoted his long and active career steadfastly to the advancement of ichthyology, as Leonard P. Schultz and Elmer Higgins indicate in their biographical sketches, and as the following list of his publications testifies. The only major deviation from the pursuit of this branch of science was in a series of researches on the culture and biology of turtles, that gave him rank as a herpetologist as well. It is, therefore, doubly appropriate that the American Society of Ichthyologists and Herpetologists pays tribute to him in this memorial number of Copeia.

Hildebrand's contributions to science cover a considerable range of topics, each of which represents a stage or period in his career and each of which has been significantly enlightened and advanced by his persevering labor. Mastery of each subject arose not only from innate competence, but also from his habit of concentrating on one problem at a time, with little overlap between problems, and of completing each project in turn.

In each field, Hildebrand's publications reflect his humanistic attitude as well as his scientific spirit. Much of his work either bears directly on human welfare or was designed and written for understanding and use by a large interested public, instead of by only a few specialists.

With the exception of his reports on the operation and researches of the Beaufort Laboratory, one joint study on food of trout, two obituaries of Hugh M. Smith, and the well-written chapters on "Fishes" in Tressler's *Wealth of the Seas* and in the *Smithsonian Scientific Series*, all publications by Hildebrand may be considered under eight topics:

Culture and Biology of Turtles.—The publications in this category deal largely with the artificial culture and the behavior of the valued diamondback terrapin. Other subjects were treated and certain phases of this essentially economic research were expanded into significant contributions on growth, teratology, and hybridization.

Mosquito Control and Biology of Larvivorous Fishes.—In this field, similarly, Hildebrand produced not only technical and popular reports on the applied aspect of the investigation, but also several supplementary papers on special subjects. Particularly significant were his studies on the life-history and the sex-ratios of fishes that, largely as a result of his work, have been used very widely and successfully in the control of mosquito-borne diseases.

Early Development of Eastern North American Fishes.—Hildebrand's painstaking research and his mastery of descriptive methods are exemplified in six reports (three with Louella E. Cable) that constitute an outstanding and pioneering contribution to knowledge of the early life-history stages of American fishes. The work on the Sciaenidae was particularly thorough and important, from the standpoint of fisheries biology as well as that of natural history. Much additional material had been accumulated by Hildebrand for further needed studies in this field.

[1] Contributions from the Scripps Institution of Oceanography, New Series, No. 459.

Samuel F. Hildebrand, from a plaque by Carleton W. Angell, to be hung in the Hall of Fishes in the Museum of Zoology at the University of Michigan.

FAUNAL STUDIES ON NORTH AMERICAN FRESH-WATER FISHES.—Seven publications in this field (two with Barton W. Evermann) followed Hildebrand's maiden contribution, a semipopular report (with Seth E. Meek) on the fishes of the Chicago area. These deal chiefly with the faunas of the Tennessee, Potomac, Catawba, Savannah and lower Mississippi rivers. They constitute a considerable though hardly an outstanding contribution.

FAUNAL STUDIES ON CENTRAL AMERICAN FRESH-WATER FISHES.—Much more extensive and important were Hildebrand's studies in this area. *The Fishes of the Fresh Waters of Panama* (with Seth E. Meek), one of his major monographs, was, except in its initial stages, wholly the product of his own labors. It was preceded by descriptions of new species and was rather recently brought up-to-date in a supplementary catalogue. About eight other papers and notes contribute further to knowledge of the freshwater fishes of Panama, Costa Rica, El Salvador and Puerto Rico.

MARINE FISHES OF EASTERN NORTH AMERICA.—A dozen careful studies by Hildebrand very materially advanced knowledge of the systematics, distribution, and general natural history of our East Coast fishes. The major monograph on *The Fishes of Chesapeake Bay* (with William C. Schroeder) not only carried a large amount of new systematic and ecological data but also summarized the published information, for the benefit of the interested public as well as ichthyologists. Especially noteworthy, too, are the large reports on the systematics and biology of Tortugas fishes, which Hildebrand laboriously compiled and augmented in posthumous collaboration with William H. Longley.

MARINE FISHES OF PANAMA AND PERU.—The three-volume treatise on *The Marine Fishes of Panama,* prepared by Hildebrand after the death of the nominal senior author (Seth E. Meek), and the more recent monograph, *A Descriptive Catalogue of the Shore Fishes of Peru,* will long remain standard references and are among the grandest memorials that a naturalist might desire. Both were written for general as well as specialist use. Of broad interest are his discussions of the disjunction of the tropical American marine fauna by the emergence of the Isthmus of Panama, with resultant differentiation of species, and his evidence on the partial breakdown of this barrier by the construction of the Canal. The Panamanian monograph was augmented by three short published papers and the Peruvian book has just been supplemented by a joint paper with Otis Barton. In prospect was a much-needed companion monograph on the fishes of Chile, which, along with a nearly completed general supplement to the Panamanian monograph, was unselfishly deferred, pending the completion of the manuscript on the clupeoids, for the *Fishes of the Western North Atlantic.*

REVISIONS OF AMERICAN CLUPEOIDS AND CONTRIBUTIONS TO "FISHES OF THE WESTERN NORTH ATLANTIC."—Hildebrand's most impressive and meritorious single contribution to systematic ichthyology was *A Review of the American Anchovies* (*Engraulidae*). Because of this accomplishment and because of his extensive studies of East Coast and Panamanian fishes, Hilde-

brand was assigned the sections on clupeoids for the colossal project, *Fishes of the Western North Atlantic*. To this task, in co-operative spirit, he allotted, since early in 1944, most of his time, working effectively, though handicapped by the heart ailment to which he finally succumbed. Conforming with the set policy, he recently described new species and revised the menhadens (*Brevoortia*), in preparation for the publication of the nearly completed compilations.

We trust that others will finish this task in the unselfish spirit in which Hildebrand undertook it. We also trust that his supplement to *The Marine Fishes of Panama* will be completed and published and that adequate use will be made of material accumulated for the treatise on the marine fishes of Chile and for further elucidation of the early development of Atlantic marine fishes. Ichthyologists everywhere further hope that the Fish and Wildlife Service will be wise enough to provide for the continuation and expansion of the splendid work that he was doing.

Any one of the eight series of researches discussed above would provide Hildebrand a respected place in the annals of American natural history. Together, they accord him high rank. He would be the last to claim a position among the outstandingly great and inspired leaders and would, I think, even question seriously our appraisal of him as a leading figure in the post-Jordanian period of American ichthyology. For, in addition to other fine qualities already mentioned, modesty, objectivity and self-criticism were among his outstanding traits. He was ever a steady, conscientious and intent laborer in the cause of science. All these characteristics, augmented by his genuinely co-operative and genial nature, induced warm friendship for the man, as well as respect for the scientist.

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U.S. NATIONAL MUSEUM, WASHINGTON, D.C.

Hildebrandella, a New Generic Name for a Carangid Fish from the Philippines

By J. T. Nichols

Evermann and Seale (1907: 65–66) described and figured *Citula halli* from the Philippines. In reviewing species of *Citula* some years ago (1920: 13), I was certain that this species did not belong in that genus, and questioned whether it was a carangin. It is only recently that I have exam-

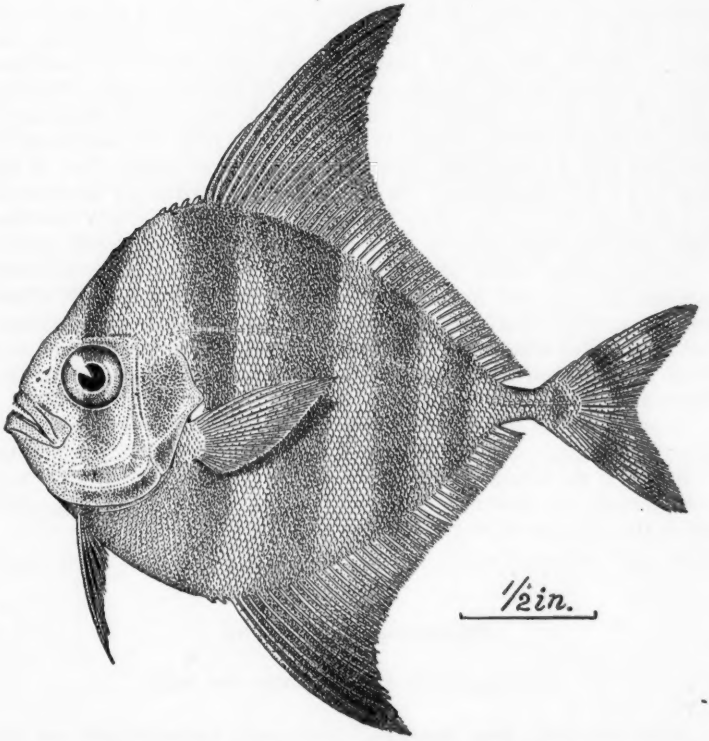

Fig. 1. *Hildebrandella halli* (Evermann and Seale). Holotype, U.S. Nat. Mus. No. 55914, 2.5 inches long (from Fig. 5 of Evermann and Seale, 1907).

ined 2 specimens of *halli*, 49 and 52 mm. in standard length (Amer. Mus. Nat. Hist. No. 18301), from the market at Batavia, Java, collected by the Instituut v. d. Zeevisscherij, in August, 1941.

In *Citula,* as in most carangins, the first dorsal, though it may be small and its spines feeble, is well developed and differentiated from the second. This is true even of its deepest-bodied species. In *halli,* however, it is reduced to a few small isolated spines before the elevated front of the second dorsal. A somewhat similar condition is present in the carangin genus *Alectis* but is not really comparable, as there was obviously a well differentiated first dorsal in *Alectis* which has become rudimentary. In *halli* there are more numerous dorsal and anal fin rays than in *Citula,* and the shape of these fins is different, their high anterior lobes being relatively broad-based. The breast is fully scaled. The upper jaw is seemingly not at all protractile, a character which differentiates *halli* from *Citula* and at least most carangins.

I am familiar with no other genus in the Carangidae which *Citula halli* resembles, and am struck with its resemblances to *Platax,* a supposedly entirely unrelated fish. It has the same deep, compressed, rhomboid body; the similarly shaped, many-rayed (and seemingly scaly) dorsal and anal fins, with a few initial spines; and elongate, anteriorly placed ventrals. The number of dorsal and anal spines ties in with that in *Platax teira* which has V dorsal (versus IV, or IV, I) and III anal (versus II), but the most posterior spines in each fin are longer, forming a more or less integral part of the front of the lobe behind them. On the other hand I find in our specimens a carangid character overlooked by Evermann and Seale, a tiny fifth (procumbent) antrorse dorsal spine in front of the four they counted and figured.

At first glance *Citula halli* is a *Platax,* but with characteristic narrowed carangid peduncle and forked caudal. However other fundamental differences demonstrate that it does not belong to the Platacidae: gill-membranes free from, rather than broadly united to, the isthmus; teeth simple and in a single series, instead of tricuspid and arranged in a band; scales cycloid versus ctenoid.

Since I have not found that *Citula halli* has been described as, or referred to, any other genus, a new generic name is here proposed for it. It is tentatively left in the family Carangidae on account of its characteristically narrow peduncle and forked caudal, antrorse dorsal spine, two isolated spines before the anal, and other carangid characteristics.

Hildebrandella, new genus

Genotype: *Citula halli* Evermann and Seale

Head and body, deep, rhomboid, compressed; peduncle narrowed and caudal well forked, as usual in the Carangidae. Upper jaw not protractile; teeth simple, slender, and pointed, arranged approximately in a single row in the jaws. Dorsal fin elevated, broadly falcate, of about 40 rays, preceded by 4 small spines and one minute procumbent spine. Anal fin similar, somewhat lower, of between 35 and 40 rays preceded by 2 small spines. Ventral fins long, inserted under the middle of the head, well before the pectorals. Body including the breast, completely covered with small cycloid scales. Lat-

eral line running almost straight back, then curving down to reach the midline of the body over the last third of the anal. Lateral line scales on the base of the peduncle more or less ridged and tricuspid, slightly larger than those before or behind, but smaller than the undifferentiated scales on the middle of the side.

This genus is named for our esteemed colleague, Dr. Samuel F Hildebrand, whose extensive painstaking study of marine fishes clarified a variety of genera.

Unlike *Apolectus niger,* which is presumably a carangid that has assumed much the habitus of the Stromateidae, the relationships of *Hildebrandella halli* to the Carangidae, or possibly to the Platacidae on the other hand, are merely speculative. Its characters are quite out of line with those of *Citula,* or of other more or less deep-bodied specialized carangin genera. The slightly specialized scales on the base of its peduncle seem rather what might be expected as a first correlation with that kind of tail, than any other of the different types of reduced scutes found in such genera. The hypothesis that this fish is primitive, and thereby suggestive that ancestors of the Carangidae were closer to the deep-bodied Platacidae than are modern forms, has something in its favor. As Dr. W. K. Gregory suggested to me some years ago, there is independent evidence that the Carangidae had deep-bodied ancestors (Gregory, 1933: 301). This might account for their prevalent short body cavity, and the differentiation of the lateral line into an anterior arch and a posterior straight part, supposing greatest lengthening of the body to have taken place tailward.

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Profundulus hildebrandi, A New Cyprinodontid Fish from Chiapas, Mexico

By Robert Rush Miller

CYPRINODONTS of the genus *Profundulus* are characteristic inhabitants of the mountain streams of Middle America. Although *P. punctatus* descends to as low as 400 feet along the Pacific Coastal Plain, most of these killifishes live between altitudes of 2,900 and 7,200 feet. In southern Mexico and Guatemala, they ascend higher than do any other native fish. The adults show a distinct predilection for swiftly flowing waters.

Recent expeditions to southern Mexico and Guatemala have greatly augmented our limited knowledge of this genus, which is presumably near the basal stock from which the Fundulinae sprang (Hubbs, 1924: 12; Myers, 1931: 248–250). The thousands of specimens collected represent a number of species, one of the most distinctive of which is described below as new to science. I take great pleasure in dedicating it to the memory of Dr. Samuel F. Hildebrand, in appreciation for his significant contributions to our understanding of the ichthyology of Central America.

Profundulus ***hildebrandi,*** new species

Plate I

Types.—The holotype, a nuptial male 66.5 mm. in standard length, was collected by Norman E. Hartweg and Salvador Coronado at San Cristóbal de las Casas, in the Atlantic drainage of Chiapas, Mexico, on April 14, 1941; field numbers 697–703, University of Michigan Museum of Zoology 157633. Five hundred and fifteen paratypes, all from the same locality, were collected as follows: 485, 11–109 mm. long, UMMZ 157634, secured with the holotype; and 30, 25–48 mm. long, UMMZ 157652, collected by Myron Gordon, James W. Atz and Sr. García from the same locality on January 27, 1939.

Diagnosis.—This species of *Profundulus* has a uniformly slender body, a long and broad head, and a large mouth with strongly projecting lower jaw. The moderately fine scales number 34 to 37 along the side. There is no dark humeral blotch behind the head. The distinctive color pattern consists of numerous vertical bars in juveniles and in small adults. There is a rather inconspicuous but evident dark spot at the base of the caudal fin. The dorsal origin is distinctly behind that of the anal and the anal fin of the female is elongated as in *P. labialis.*

Description.—The form and coloration of the nuptial adult male are shown in Plate I, and the proportional measurements of 10 adults of each sex are given in Table I. The following ratios, obtained under magnification with a pair of fine dividers, give the results for certain stepped measurements. The data are based on 30 specimens: 10 males, 49–72 (ave. 59) mm. long, 10 females, 46–72 (ave. 57) mm. long, and 10 juveniles, 25–36 (ave. 31) mm. long. If there is sexual dimorphism or pronounced change with age, the sexes are segregated or the adults are treated separately from the juveniles. The values for the holotype are inserted in parentheses. In

standard length: head length, 3.1–3.35 (3.2) in males and juveniles, 3.3–3.6 in females; head width, 4.8–5.5 (5.25) in males, 5.2–5.8 in females, and 5.05–5.6 in juveniles; body depth, 3.8–4.4 (4.0) in males, 4.0–4.6 in females and juveniles; dorsal origin to caudal base, 2.75–3.1 (2.8); anal origin to caudal base, 2.5–2.75 (2.6). In head length: least depth of caudal peduncle, 2.25–2.7 (2.4); least bony width of interorbital 2.55–3.05 (2.85); snout length, 2.95–3.15 (3.0) in adults, 3.1–3.5 in juveniles; orbit length, 4.05–4.75 (4.6) in adults, 3.2–3.8 in juveniles; and mouth width, 2.45–2.9 (2.55) in adults, 2.95–3.1 in juveniles.

TABLE I

PROPORTIONAL MEASUREMENTS OF 20 ADULTS OF *Profundulus hildebrandi*

Expressed in thousandths of the standard length. Ten specimens of each sex were measured.

Measurement	Holotype	Paratypes (UMMZ 157634)			
		Males		Females	
	Nuptial Male	Range	Ave.*	Range	Ave.
Standard length, mm.	66.5	49— 72	59	46— 72	57
Dorsal origin to tip of snout	666	654—676	663	652—681	667
Pelvic insertion to tip of snout	504	490—501	499	470—505	486
Anal origin to caudal base	391	374—391	385	357—395	378
Body, greatest depth	250	229—265	247	212—251	229
Greatest width	173	158—178	169	147—168	158
Head, length	325	303—322	314	278—304	291
Depth	205	183—202	196	170—187	178
Width	191	177—199	189	169—193	178
Caudal peduncle, length	219	215—232	225	205—244	228
Least depth	140	131—142	137	117—130	123
Interorbital, least bony width	122	113—132	119	107—116	111
Preorbital, least width	48	43— 47	45	39— 46	43
Opercle, greatest length	113	102—127	113	94—110	103
Snout, length	113	102—115	108	91—105	98
Orbit, length	72	68— 78	72	65— 76	70
Mouth, width	131	118—133	124	104—125	112
Upper jaw, length	117	103—120	110	91—106	98
Mandible, length	102	88—108	98	73— 92	83
Dorsal fin, basal length	158	137—159	149	126—148	138
Depressed length	280	230—259	246	196—228	213
Anal fin, basal length	173	148—174	163	143—168	154
Depressed length	254	228—258	242	226—261	242
Middle caudal rays, length	199	179—206	192	176—207	188
Pectoral, length	173	159—173	167	152—164	159
Pelvic, length	126	114—122	119	107—123	115

* Holotype included.

Fin-ray and scale counts, made on 70 specimens, give the following results,[1] with means in parentheses. Dorsal rays 11–13 (12.04); unbranched dorsal rays 1–3 (2.10); anal rays 14–17 (15.37); unbranched anal rays 2–3 (2.03); pectoral rays 15–19 (17.71); pelvic rays invariably 6 (in 25 fish); and caudal rays 18–21 (20.07). Lateral scales 34–37, usually 35 or 36 (35.29);

[1] The methods of counting, as well as measuring, are those discussed in detail by Miller (1948: 9–13).

predorsal scales, including those on head, 24–28 (25.73); scales between occiput and dorsal 20–23 (21.57); scales around caudal peduncle 16–19 (17.52); and scales around body 27–32 (29.39). The count of body scales is subject to some error because of the crowded squamation ventrally and the high frequency of regenerated scales.

The gill rakers of 30 specimens number from 14 to 18 (16.30).

In agreement with a diagnostic character of the genus *Profundulus,* recently pointed out by Gosline (1949: 4, 5, 11, 14), the mandibular and preopercular sensory canals are either continuous or barely separated (in all other cyprinodonts studied by Gosline these two canals are well separated or, in three species of *Fundulus,* are only a little separated, but more so than in *Profundulus*). In 50 specimens of *P. hildebrandi* the mandibular and preopercular canals are completely united on both sides in 31 adults, whereas in 19 young 10 have these canals united and 9 have them almost united. All sensory canals are open grooves in a 17-mm. young, but are roofed over, except for the pores, in a 25-mm. fish. The closure of the canals thus takes place at lengths between 17 and 25 mm. The pores are unusually well developed in the new species, standing out very clearly with the aid of a jet of compressed air under magnification. Except for the continuous preopercular-mandibular canals, their arrangement is essentially the same as that in *Fundulus similis* (Gosline, 1949, Pl. 2, Figs. 1–2). There is disruption of the supraorbital canal in the prenarial and in the postorbital sections, but the postorbital series is complete. Thus the supraorbital canal is complete between pores 1–2a, 2b–4a, and 4b–7. There are 7 preopercular, 5 mandibular and 4 preorbital pores. No careful study of variation in position and number of pores was made, but casual observations indicate that such variation is slight.

Sexual Dimorphism.—Although considerable sexual dimophism is exhibited by the new species, some of the more obvious distinguishing sexual characters usually found in cyprinodont fishes are not apparent. Thus, unlike most cyprinodonts, there is no difference between the sexes in the position of the dorsal fin (Table I). The genital papilla, a diagnostic character of males in such genera as *Fundulus* and *Cyprinodon,* appears to be absent. In agreement with the other species of *Profundulus,* as distinguished from *Fundulus* (Hubbs, 1924: 12), there is no genital pouch about the front of the anal fin of the female.

The anterior parts are much better developed in the male than they are in the female. Thus males have: (1) a much longer and somewhat wider head; (2) a broader interorbital region; (3) a longer snout; (4) a longer opercle (a further expression of the longer head); (5) a broader mouth; (6) a longer upper jaw; (7) a longer mandible; and (8) a somewhat longer pectoral fin. In addition, the male has a deeper and wider build, not only through the abdominal region, but also through the head and caudal peduncle. The base of the dorsal fin is longer than in the female and the depressed length of this fin is markedly greater. The length of the anal fin base is slightly, perhaps not reliably, longer, and the depressed length of that fin is the same in mature males and females (Table I). The shape of the anal fin, however, shows a marked sexual difference that is not expressed by this measurement. The anterior anal rays of the male are not greatly longer than the posterior ones,

Holotype of *Profundulus hildebrandi*, a nuptial male 66.5 mm. in standard length. Photographed by Fred Anderegg.

giving the distal margin of the fin an evenly rounded border. But in the female, since the medial rays, from about the sixth to the tenth, are much longer than either the anterior or posterior rays, the distal margin of the fin is lobate when expanded, as it is in the female of *P. labialis*. The sexual difference in the shape of these fins in *hildebrandi*, however, is not nearly so pronounced as it is in *labialis*. In the mature male the dorsal and anal fins are subequal in total area, but in the female the total expanse of the dorsal is scarcely more than half that of the anal. The pelvic fins are somewhat farther forward in males than they are in females.

Contact organs or ctenii constitute a further, though not striking difference between the nuptial male and female of the new species. Only a few tubercles are evident and these are observed only on the anal fin; they are aligned along the rays and are confined largely to the distal half of the fin. The nuptial organs are weakly developed, perhaps because the nuptial development had not reached its height when the collection was made on April 14. The late January collection contains only 2 mature males and these have no tubercles.

There may be some sexual dimorphism in size, for the 3 largest fish in the collection, 83, 104, and 109 mm. long, are all females. The largest male is 82 mm. long. Furthermore, a male 42 mm. long has swollen testes and nuptial coloration, whereas the smallest female with ripe eggs among the several examined, is 55 mm. long.

Coloration.—As already indicated, the diagnostic color pattern of the species is developed in the young and in the small adults, but changes with growth and with the attainment of sexual maturity. This pattern consists of about 10 to 17 narrow, vertical bars of irregular shape extending across the sides from the head to the base of the caudal fin. These markings evidently do not appear very early in development, for 5 newly hatched young, 11 to 16 mm. long, show no trace of bars. The next largest fish in the collection, a specimen 25 mm. long, has about 11 developed vertical bars on the left side and 9 on the right. A dark middorsal streak, extending forward about two-thirds of the way from the dorsal origin to the occiput, has also appeared.

From this length up to about 47 mm. the bars are well developed in both sexes but are rather variable in number and arrangement. In some individuals only 1 or 2 of the bars are continuous; in others nearly all are continuous; still others have few to numerous segments of bars, or small blotches, interpolated between the principal bars; and in some, the principal bars are divided ventrally to form an inverted Y or take the shape of a reversed tuning fork. The middorsal stripe becomes intensified and expanded at the front of the dorsal, but still does not extend to the occiput.

On comparing a mature male and female, each 47 mm. long, it is seen that the bars are now entering the developmental stage that leads, with further growth, to the abrupt disappearance of these markings in males and to a very gradual decrease in their intensity in females. In the 47 mm. fish, there are about 16 bars in the male and about 17 in the female. In the male, however, the dorsal and ventral parts of the markings are disrupted and the interspaces have irregular short bars and spots, whereas in the female the interspaces are largely devoid of markings and the vertical bars are much more continuous, especially anteriorly. In overall effect, the female is ob-

viously barred whereas the male is only obscurely barred. A male 50 mm. long shows only a trace of the bars, but they are not invariably absent above this length, for in another example, 56 mm. long, the bars are fairly well developed posteriorly. No bars were observed in males longer than 60 mm. The markings also vary individually in females. A specimen 53 mm. long has them almost obliterated but they are well to moderately developed on other females 60, 66, and 72 mm. long.

The ground color of the mature male in alcohol, is orange-brown, with dark pigmentation showing through most of the exposed margins of the scales, except for a creamy area on the basal one-third of the scale. The contrast between the dark pigment and the light areas gives the fish a spotted appearance, with the spots tending to form horizontal rows. A dark middorsal stripe, often rather faint, runs anteriorly from the dorsal origin, but fades out before reaching the occiput. There is no such streak posterior to the dorsal fin, as there is in other species of *Profundulus*. The top of the head is much darkened. The basal one-half to two-thirds of the dusky dorsal fin is rather finely pigmented. The basal two-thirds of the anal fin is deeply pigmented (dusky to densely blackened) in contrast to the outer third, which is conspicuously milky yellow (probably deep yellow in life). Most of the caudal fin is blackened except for the milky yellow interradial membranes, but the outer fourth is pale, forming a broad margin similar to, but less conspicuous than, that of the anal fin. The caudal spot is rather weak, occasionally absent. The pectoral rays are heavily pigmented, but the interradial membranes, except near the wholly dark base of the fin, are milky yellow. The pelvics are similarly pigmented in some males but are much lighter to almost immaculate in others. In some males a narrow light bar, occasionally rather irregular in outline, extends the length of the dorsal fin just above its base and a light area, of much more irregular outline, occurs in a similar position on the anal fin.

The ground color of the mature female is a golden brown, similar to, but less intense than, that of the male. Dark pigment underlying the scales is arranged in an irregular criss-cross pattern that largely outlines the scale margins, leaving most of the scale centers free of pigment. This arrangement of light areas outlined by dark pigment also gives a spotted effect, much like that of the male, but the spots are not regularly aligned in horizontal rows. The middorsal stripe, especially in the larger females, is somewhat narrower and weaker than it is in the male. The top of the head is darkened, as in the male. The pigmentation of the fins is largely or wholly confined to the rays, except on the dorsal fin and on the median part of the anal fin, where the interradial membranes are pigmented. As in the male, there are irregular light markings near the dorsal and anal bases that are often set off, above and below, by a narrow dark bar. The dorsal becomes distinctly paler on its margin as the anal does on its outer third to half, but there is no definitive color border on these fins as in the male. This is also true of the caudal fin. The pectoral and pelvic fins are pigmented as in the male, or are somewhat paler. The caudal spot is occasionally absent.

HABITAT AND ASSOCIATES.—Laguna María Eugénia is a pond on the western outskirts of San Cristóbal de las Casas, which is often referred to as

Ciudad de Las Casas or simply as Las Casas. This town is about 32 miles by airline east of Tuxtla Gutiérrez, the capital of the state of Chiapas. The lake is about 2,200 meters (7,260 feet) above sea level. Las Casas lies on a high limestone plateau that extends unbroken to the northwest and southeast for more than 40 miles (see Map NE 15, American Geographical Society). The fish were collected only at or in the outlet of the laguna, which is tributary to Río de Chiapilla by way of a precipitous gorge below the plateau. The waters of the pond, which may be springfed, eventually find their way into Río Grande, also called Río de Chiapa or Río Grijalva, which enters the Atlantic not far from the mouth of Río Usumacinta.

Dr. Hartweg tells me that vegetation abounded along the lake shore at the outlet where he and Coronado collected in 1941, but the field notes of Dr. Gordon record no vegetation in the outlet stream where the 1939 collection was made. In that collection, made on January 27, the temperature of the brownish water was 68°F. at 10 A.M., the bottom was rocky and the current slight. The fish were seined at a distance of 3 feet from the stream bank in water 2 feet deep. This was the maximum depth of the outlet at this point. Myron Gordon recorded that his party failed to find any fish in 2 other lagunas and their inlets. It was only in the outlet of Laguna María Eugénia that they secured *Profundulus*.

This is apparently an omnivorous fish. An examination of the intestinal tracts of 5 adults reveals much vegetation and vegetable debris, numerous insect remains (adults, pupae and larvae), a few molluscs and some sand and grit.

COMPARISONS AND RELATIONSHIPS.—Eight nominal species have been referred to *Profundulus*. In order of description these are: *P. punctatus* (Günther), *P. guatemalensis* (Günther), *P. pachycephalus* (Günther), *P. labialis* (Günther), *P. oaxacae* (Meek), *P. candalarius* Hubbs, *P. balsanus* Ahl, and *P. scapularis* Fowler. Both *guatemalensis* and *pachycephalus* have been synonymized with *punctatus* (Regan, 1906–08: 78; Hubbs, 1924: 13), but examination of extensive new collections from Guatemala convinces me that *guatemalensis* is distinct from *punctatus*. I suspect that *P. pachycephalus* is a synonym of *punctatus* rather than of *guatemalensis*. These matters will be dealt with more fully in a forthcoming revision of the genus.

Study of 42 specimens of *P. scapularis* (U.S. National Museum 144388) from the type locality, Finca Mocá near the base of Volcan de Atitlán, Guatemala, shows that this nominal species is indistinguishable from *punctatus*. In the original description *scapularis* was compared only with *P. candalarius*, a poorly known and evidently not closely related species, from an entirely different drainage system (Atlantic), whereas no mention is made of *P. punctatus*, the only species of *Profundulus* known in the region from which *scapularis* was described. Furthermore, the specific name *scapularis*, in reference to the dark humeral blotch behind the gill opening, emphasizes an outstanding characteristic of both *P. punctatus* and *P. guatemalensis*. *P. hildebrandi* therefore needs to be compared only with 6 species.

Four of these species, *punctatus*, *guatemalensis*, *oaxacae*, and *balsanus*, appear to form a natural group characterized as follows: (1) preorbital scaled; (2) caudal fin densely scaled about half way or more to tip; (3)

scales in lateral series 30 to 35; (4) anal fin of female not especially elongate; (5) head long and broad; (6) lower jaw broad and heavy, its tip projecting well beyond that of upper jaw; (7) coloration dark, with a dark lateral band or with rich brown spots; and (8) humeral spot present. The included species, which I refer to as the *punctatus* group, contrast strongly with *labialis* and related forms (yet undescribed) which share the following characters: (1) preorbital naked (rarely with an embedded scale); (2) caudal fin densely scaled about a third of the way to tip; (3) scales in lateral series 36 to 39; (4) anal fin of female extremely elongate; (5) head short and narrow; (6) lower jaw moderate, like the upper jaw, and either equal in forward projection or included; (7) coloration light, without lateral band but with disrupted light markings posteriorly and with a tendency for the formation of horizontal rows of light spots in both sexes; and (8) no humeral spot. *P. candalarius* is known to me only from the original description and I am unable to assign it with certainty to either the *punctatus* or *labialis* groups.

Profundulus hildebrandi differs from the species of the *punctatus* group as follows: (1) the preorbital is naked in the region above the lowermost preorbital pore (rarely with 1 embedded scale); (2) the scales on the caudal fin extend only about a third of the way from the base to the tip of the fin; (3) the scales are smaller, numbering 34 to 37, almost invariably 35 or 36; (4) the anal fin of the female is elongate; (5) the coloration is light, with 10 to 17 irregular vertical bars in juveniles and small adults, with horizontal rows of light spots, and without a dark lateral band or a humeral spot; (6) the dorsal origin lies behind, instead of over or in advance of, the origin of the anal fin. The new species resembles the *punctatus* type in having a broad, heavy projecting lower jaw and a long and broad head.

In comparing the new species with each of the species comprising the *punctatus* group, additional differences are revealed. In *guatemalensis,* the vertical bars across the sides, which number about 6 to 9, are much broader and less distinct, and they are usually connected ventrally by chain-like reticulations.

In *punctatus,* the scales are much larger, for they number only 30 to 33 along the side. In addition, *hildebrandi* lacks the principal distinguishing characteristic of *punctatus,* namely the rich brown spots on the scales that form longitudinal rows extending along the midsides from about the pelvic insertion to well out on the caudal fin. These spots, however, vary considerably in *punctatus,* in number and development.

P. oaxacae, like *punctatus,* has large scales, that number 30 to 33, usually 31 or 32.

P. balsanus, a species described by Ahl (1935: 108) as from the basin of Río Balsas at Malinaltepec, Guerrero, Mexico, is reported to have 32 to 34 scales (32 and 33 in the two paratypes at hand); its dorsal fin originates in advance of the anal; and its coloration resembles that of *punctatus* and *oaxacae,* to which Ahl believed his species is closely related. Through the courtesy of Dr. Deckert of the Berlin Museum and Dr. Erna Mohr of the Hamburg Museum, the University of Michigan has received two paratypes (UMMZ 157291) of this species. Although evidently representing a mature male and female, the fish are very small (24 and 25 mm. standard length) and have

been dried out, so that the characters of the species, if it be valid, cannot readily be determined. The reported capture of this species in the Río Balsas is open to question. Dr. José Alvarez, of the Escuela Nacional de Ciencias Biológicas in Mexico City, wrote me on August 13, 1949, that his examination of over 200 collections from this river system has failed to reveal a single specimen of *Profundulus*. In Guatemala I have found representatives of the genus to be common to abundant wherever taken. Malinaltepec evidently is on the southern edge of a 2,000-meter plateau which rises northward toward the Balsas basin (see Map NE 14, American Geographical Society), and it may actually lie in the drainage of Río Santa Catarina, an independent Pacific tributary reaching the ocean about 80 miles west of Acapulco. *Profundulus* occurs both to the north and to the south of this stream, respectively in Río Papagayo and Río Verde.

P. hildebrandi differs from the 2 types (and only known specimens) of *P. candalarius,* as described by Hubbs (1924: 16), in the following important respects: (1) the body is slenderer, its depth 3.8 to 4.6 instead of 3.4 to 3.5 times in the standard length; (2) the interorbital is narrower, its least width 2.6 to 3.1 rather than 2.5 times in the head length; (3) the dorsal fin is more anterior, for the distance between the caudal base and its origin is contained 2.75 to 3.1 rather than 3.2 times in the standard length; and (4) there is no humeral spot.

Profundulus hildebrandi resembles *P. labialis* in the technical characters in which the new species contrasts with the *punctatus* group. It is most strikingly distinguished from *labialis* and its relatives by the heavy, projecting lower jaw. When the fish is viewed directly from below, the teeth and upper jaw are readily visible in *labialis,* but are completely hidden by the projecting lower jaw in *hildebrandi.* The head is longer and broader in the new species than in *labialis;* its length, when stepped into the standard length, gives ratios from 3.1 to 3.55 in 30 specimens (25 to 72 mm. long), rather than 3.45 to 4.05 in 30 topotypes and subtopotypes of *labialis* (29 to 77 mm. long; USNM 134632 and 134634). At comparable sizes there is no overlap in these ratios. The evenly slender body and the coloration further distinguish *hildebrandi* from *labialis.* In color pattern, *hildebrandi* approaches the species of the *labialis* group much more closely than it does *punctatus* and its relatives.

It may be inferred from the fundamental resemblance between *hildebrandi* and *labialis* that the two species were derived from a common ancestral stock, but if so the divergence probably took place early in the evolutionary history of the genus. It seems very unlikely that the similarities represent parallel or convergent evolution, since the characters shared by these two species are common to all the forms of the *labialis* group and are uniformly absent in the species of the *punctatus* group. The similarity in jaw and mouth configuration in the new species and in the forms of the *punctatus* group is interpreted as the result of secondary convergence rather than of close relationship. A remote hybrid origin for *hildebrandi* might also be postulated, since it combines characters distinctive of each species group and since a representative of each group occurs in the same stream basin, that of Río de Chiapa.

The distinctive specific characters of the new species are evidently cor-

related with its differentiation through geographic isolation. It appears to be the only fish on the high limestone plateau around Las Casas, and the outlet gorge of Laguna María Eugénia is evidently too precipitous to allow the ascent to the plateau of any species of fish which has access to it. The origin of *hildebrandi* must therefore have taken place at a time when it was possible for fish life to reach this plateau. This was presumably many thousands of years ago.

SUMMARY.—*Profundulus hildebrandi*, a probable relative of *P. labialis*, is described and figured from the basin of Río de Chiapa on the Atlantic slope of Chiapas, Mexico. Two species groups of *Profundulus* are defined. The new species shares some characters with each of these groups. Its origin is related to isolation on a high limestone plateau, above a precipitous outlet gorge, to which the ancestral form presumably gained access many thousands of years ago. This species of *Profundulus* is the only fish known from the region, but representatives of *P. punctatus* and *P. labialis* inhabit the streams below the plateau. *P. scapularis* Fowler is placed in the synonymy of *P. punctatus*, and *P. guatemalensis* is recognized as a valid species.

ACKNOWLEDGMENTS.—The magnificent series forming the basis for the description of this species was collected through the efforts of Norman E. Hartweg while on an expedition sent out by the University of Michigan to Chiapas, Mexico. Myron Gordon kindly turned over his collections and field data covering the same region. While a staff member of the Smithsonian Institution, I was privileged, through the co-operation of the U.S. Fish and Wildlife Service and the Guatemalan Government, to collect for nearly 5 months in Guatemala. Adequate comparative material of *Profundulus*, thus made available, has enabled me to give a much more complete description of *hildebrandi*.

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Schilbeodes hildebrandi, A New Ameiurid Catfish from Mississippi

By Reeve M. Bailey and William Ralph Taylor

THE madtoms (genus *Schilbeodes*) are small, usually inconspicuous fishes typically living under stones in swift water, beneath undercut banks, or amidst dense vegetation in either quiet or fast water. They have long been of considerable general interest chiefly because they can deliver a painful sting with the sharp pectoral spine (Reed, 1907 and 1924). An axillary poison gland, which lies mediad to the depressed pectoral fin, discharges from a pore below the humeral process. The depressed pectoral spine overlies this pore and is then in contact with the secretion from the gland. Usually likened to a bee sting, the effect of the wound is temporarily extremely painful, but in our experience it is localized and rarely of long duration. The larger catfishes (e.g., *Ameiurus* and *Ictalurus*) share the stinging ability as young but the axillary gland is less well developed, especially in larger specimens. In *Ictalurus lacustris* the pore closes early in life.

Schilbeodes is distinguished from the other genera of the Ameiuridae, except *Noturus*, in having the adipose fin adnate to the caudal fin. From *Noturus*, *Schilbeodes* differs in lacking the lateral backward projections of the transverse band of premaxillary teeth. Ten species of *Schilbeodes* are currently recognized (Jordan and Evermann, 1896: 144–149). Four of these have been discussed recently by Hubbs and Raney (1944), who indicated that certain changes in nomenclature were called for and that *S. marginatus* is a complex of two subspecies. Misled by the marked sexual dimorphism in *S. eleutherus*, Hubbs (1930: 432) reported females from the Ohio River drainage and Huron River, Michigan, as *S. furiosus*. When the differences were recognized as sexual, *furiosus* was regarded as confined to streams of eastern North Carolina, and was first treated as perhaps conspecific with *eleutherus* (Hubbs and Lagler, 1941: 65), and later as specifically distinct (Hubbs and Lagler, 1947: 73). The distribution of *S. eleutherus* (in the Ohio River basin including the Tennessee system, in tributaries to western Lake Erie, and in parts of the Arkansas River system) overlaps that of *miurus* broadly, and these species are sharply differentiated (Hubbs and Lagler, 1947: 72–73). In many localities they live together. Although formerly confused with *eleutherus*, and in some respects resembling that species, we suspect that the relationship of *furiosus* with *miurus* is the more intimate. We are studying the problem further.

Recently Fowler (1945: 32, 122, and Figs. 155–157) described *S. gallowayi* as a new species from the Holston River, tributary to the Tennessee River. Fowler regarded *gallowayi* as the Tennessee representative of *furiosus*, but failed to compare *gallowayi* with *eleutherus*. *S. eleutherus* was not included by him in the fauna of the Tennessee River system (Fowler, 1945: 32), although the type locality of that species is in the Tennessee basin (Jordan, 1877: 370–372). That the unique type of *gallowayi* is an example of *eleutherus* is clearly indicated by an analysis of the original description

and figures, by a study of specimens recently collected in Holston River, and by the examination by Taylor of the type of *gallowayi*, a privilege made possible through the much appreciated courtesy of Mr. Henry W. Fowler. *S. gallowayi* is herewith relegated to the synonymy of *eleutherus*.

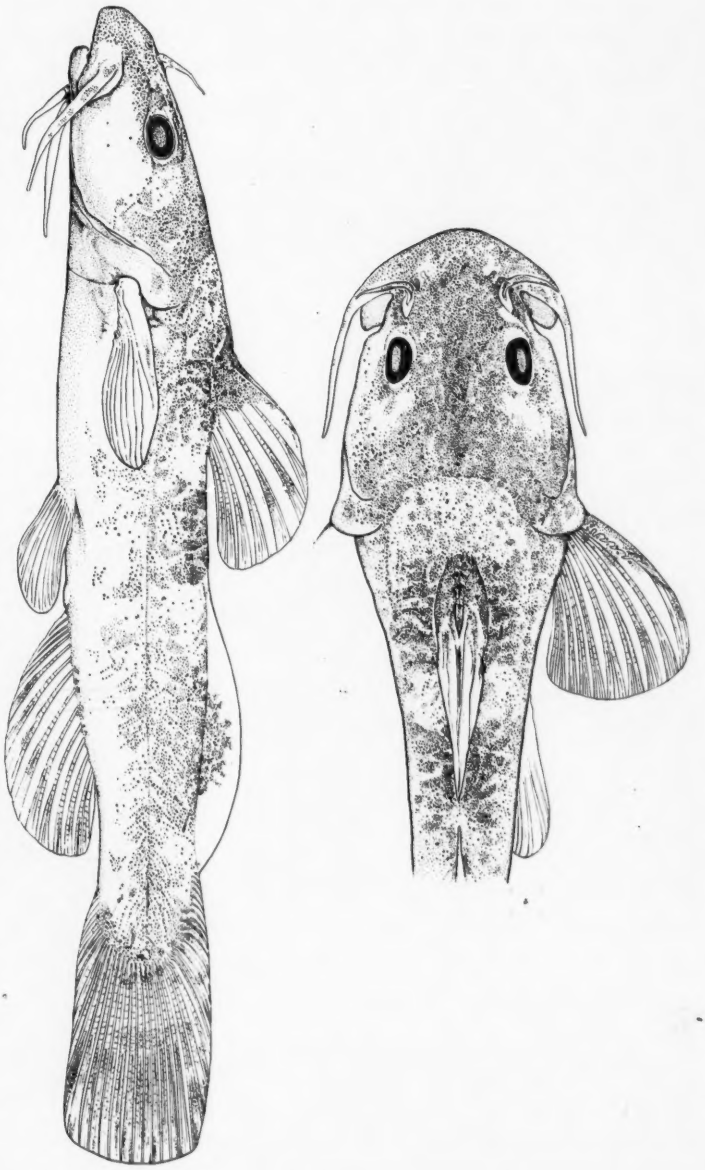
The species herein described, a dwarf representative of *eleutherus*, is one element of an apparently relict fauna found in the Homochitto River system, tributary to the Mississippi River, southwestern Mississippi. We hope soon to discuss this isolated fauna more fully. It is desirable to mention here that in addition to the new madtom at least three other species occurring in this basin (a cyprinid, a cyprinodontid, and a percid) appear to be differentiated representatives of forms which are known to occur elsewhere no closer than the Ozark and Tennessee uplands, at least 250 miles to the north. The mutual occurrence of four species, representative of four families, far removed from their closest relatives, invites speculation. This island-like suitable habitat has permitted the continued existence, in isolation, of species that represent either (1) a fragment of a formerly continuous, larger, and more widespread fauna; or (2) the product of local differentiation of populations established by waif immigrants. If the second explanation is correct it may be assumed that flood-borne stragglers were carried downstream in the Mississippi from the Ozark and/or Tennessee uplands. When swept into the influence of a clear tributary from the blufflands, such as the Homochitto, they presumably ascended into a habitat which is strikingly similar to the high-gradient streams of the more northern uplands.

In describing this little catfish we pay tribute to Dr. Samuel F. Hildebrand, whose contributions to the ichthyology of the southeastern United States will long remain indispensable tools to his successors.

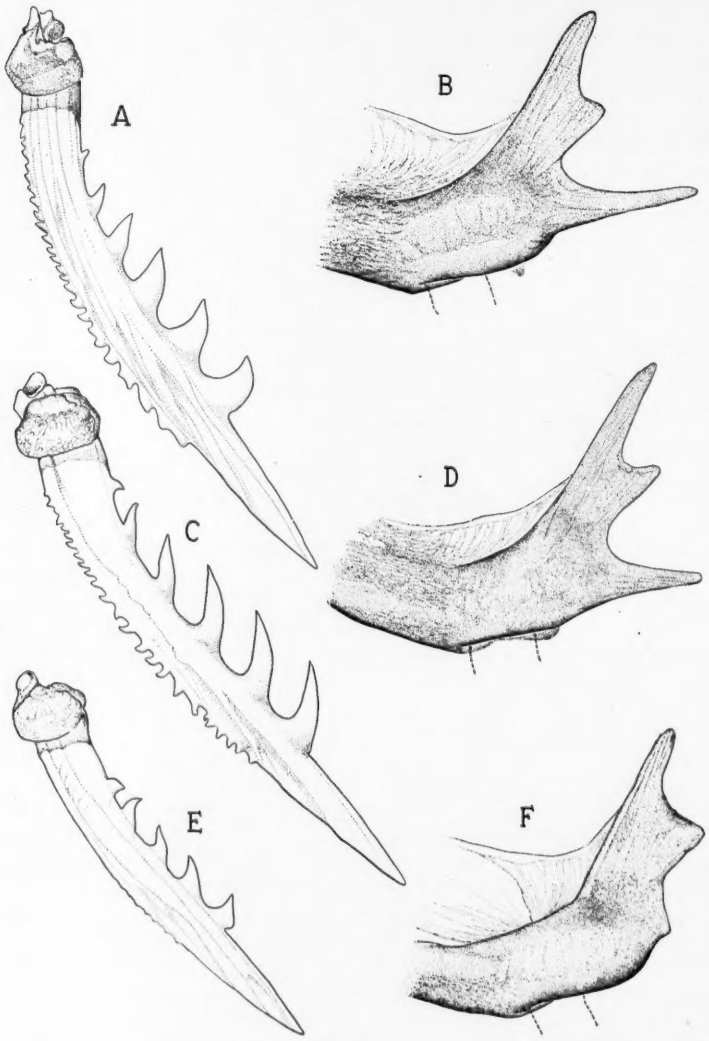
Schilbeodes ***hildebrandi,*** new species
Least Madtom
Plate I; Plate II, Figs. E and F

TYPES.—The holotype, University of Michigan Museum of Zoology 157620, an adult female, 41.3 mm. in standard length, was collected in Brushy Creek, about 1 mile above its mouth in Homochitto River, T. 4 N., R. 2 E., Sect. 14, at the tiny hamlet of Homochitto, Amite County, Mississippi, on April 1, 1948, by Marian K. and Reeve M. Bailey. Twenty-five paratypes, UMMZ 155338, 28.4 to 40.4 mm. in length, were collected with the holotype. No other specimens are known.

DIAGNOSIS.—*S. hildebrandi* is a dwarf species. Pectoral spine short (2.0 to 2.6 in head length), with an entire or scarcely roughened anterior edge and 4 or 5 strong serrations along the posterior edge; of these the proximal 1 or 2 barbs are hooked outward, the others retrorse. Dorsal spine short, 2.6 to 4.1 in head length. Humeral process very short. Head length 3.2 to 3.5 in standard length; eye moderate, the orbit 4.1 to 4.7 in head length; barbels short, the maxillary barbel not reaching pectoral base. Adipose notch placed far back, its distance from tip of caudal fin contained 1.6 to 1.9 in distance from notch to origin of dorsal fin. Anal fin short, with 12 to 15 rays; caudal fin with 44 to 48 rays (including all procurrent rays), 15 to 17 of which are branched; pectoral fin with 8 or 9 articulated rays; and pelvic rays normally



Schilbrodes hildebrandi in dorsal and lateral view, from the holotype, 41.3 mm. in standard length. Drawings by William L. Brudon.



Comparison of the pectoral spine (Figs. A, C, and E) and of the cleithrum (Figs. B, D, and F), showing variation in the humeral process, in three species of *Schilbeodes*. The pectoral spines are from the left side and are shown in dorsal aspect; the cleithra are from the left side and are shown in dorsolateral view. The dashed lines show the approximate locations of the erect pectoral spines. A and B, *S. miurus*, UMMZ 155337, a female 38.3 mm. in standard length. C and D, *S. eleutherus*, UMMZ 154552, a female 37.7 mm. long. E and F, *S. hildebrandi*, UMMZ 155338, a female 38.8 mm. long. Drawings to the same scale by William L. Brudon.

8. Coloration somber, without striking contrasts, but with 4 clearly-evident dorsal saddles or blotches, of which the first crosses the anterior half of the dorsal base and the third is excluded from, or is faint at, the margin of the adipose.

TABLE I

PROPORTIONAL MEASUREMENTS OF 10 MALE AND 10 FEMALE TYPES OF *Schilbeodes hildebrandi*

All proportions are expressed in thousandths of the standard length.

Measurement	Holotype	Other specimens				20 specimens	
						Extremes	Mean
Sex	♀	♂	♂	♂	♀		
Standard length (mm.)	41.3	39.6	35.3	32.8	30.4	30.4–41.3	36.5
Body depth	177	149	183	180	191	149–198	175
Caudal peduncle depth[1]	97	96	99	98	99	87–101	96
Snout to dorsal origin	370	359	380	351	378	351–380	367
Dorsal origin to adipose origin	274	260	286	268	289	260–299	281
Dorsal origin to adipose notch	567	561	581	561	602	561–602	578
Adipose notch to tip of caudal	303	316	331	308	312	294–345	313
Anal origin to caudal base	385	386	385	360	382	360–412	385
Caudal peduncle length[2]	206	202	221	183	211	183–235	210
Highest dorsal ray	169	164	164	174	174	144–174	161
Dorsal spine length	90	83	108	95	82	72–116	92
Adipose length[3]	278	298	297	302	322	264–322	298
Adipose height	41	40	37	43	39	33– 43	39
Caudal length	203	205	227	220	224	195–237	216
Anal base	179	182	170	186	168	153–206	182
Highest anal ray	143	146	156	152	141	129–157	147
Pectoral length[4]	196	202	224	216	211	190–224	209
Pectoral spine length[5]	145	146	150	155	138	115–155	139
Pelvic length[6]	148	152	167	168	158	147–169	156
Humeral process[7]	48	51	54	61	62	45– 62	52
Head length[8]	315	303	309	320	299	294–321	307
Head width	220	230	212	229	214	202–235	221
Head depth at occiput	128	126	127	155	148	119–155	134
Snout length	119	111	116	128	102	102–132	115
Orbit length	61	63	71	70	69	56– 71	63
Mouth width[9]	155	152	142	152	158	135–175	151
Nasal barbel	61	66	79	70	76	56– 79	65
Maxillary barbel[10]	150	167	176	189	184	150–189	174
Outer mental barbel	155	141	170	183	161	141–183	163
Inner mental barbel	92	104	105	119	105	85–119	101

[1] Excludes adipose fin.
[2] From base of last anal ray to base of caudal.
[3] Measured to notch.
[4] Measured from structural base of spine to tip of longest ray.
[5] Measured from structural base. Because of breakage both pectoral spines were measured and the longer is recorded.
[6] From insertion of outer ray to tip of longest ray.
[7] Measured from anterior base of erected pectoral spine to tip of process.
[8] To membranous margin of operculum.
[9] Inside breadth.
[10] Free length (excluding lip).

DESCRIPTION.—*S. hildebrandi* is the smallest known species of the Ameiuridae. Although only 26 specimens are known, the largest (41.3 mm.) is exceeded in length by 7 of the 18 examples of *miurus* taken in the same collection. More conclusive evidence of the small size is provided by the

TABLE II

COMPARISON OF THREE SPECIES OF *Schilbeodes*

Based on a study of the 26 types of ***hildebrandi,*** of 18 specimens of ***miurus*** (UMMZ 155337) taken in association with ***hildebrandi,*** and of 10 examples of ***eleutherus*** from Clinch River near highway 25E, Grainger County (UMMZ 154552) and 7 individuals of ***eleutherus*** from the South Fork of Holston River just above South Holston Dam, Sullivan County (UMMZ 157575), both in the Tennessee River system in Tennessee. The proportional measurements were "stepped" with dividers; ranges of variation are stated and mean values are given in parentheses.

Character	*miurus*	*eleutherus*	*hildebrandi*
Standard length (mm.)	25.4–52.0 (37.9)	33.3–61.8 (42.1)	28.4–41.3 (35.4)
Caudal notch ratio[1]	1.2–1.4 (1.3)	1.7–2.0 (1.8)	1.6–1.9 (1.8)
In standard length: Head length	3.4–3.8 (3.6)	3.2–3.7 (3.4)	3.2–3.5 (3.3)
In head length: Orbit	3.1–3.8 (3.3)	3.8–5.0 (4.2)	4.1–4.7 (4.4)
Maxillary barbel (free length)	1.0–1.5 (1.2)	1.35–1.6 (1.5)	1.6–2.0 (1.7)
Pectoral-spine length	1.3–1.6 (1.5)	1.4–1.8 (1.6)	2.0–2.6 (2.2)
Distance from anterior base of erect pectoral spine to tip of humeral process	2.9–3.4 (3.1)	3.0–4.0 (3.5)	4.7–7.0 (5.8)
Dorsal-spine length	1.7–2.2 (1.9)	1.5–2.8 (1.9)	2.6–4.1 (3.3)
Anterior pectoral-spine serrations[2]	14–37 (22.5); strong; distal serrae antrorse, middle serrae perpendicular to spine, proximal serrae retrorse	18–33 (25.5); strong; distal serrae more or less perpendicular to spine, proximal serrae retrorse	0–14, usually 6 or fewer (2.9); absent or very weak; edge of spine scarcely roughened, no well-developed serrae
Posterior pectoral-spine serrations[2]	4–8, rarely 4 (6.3); very strong; length equal to or greater than diameter of spine; strongly retrorse, the basal cusps sometimes antrorse	5–11, rarely 5 (7.4); very strong; length equal to or greater than diameter of spine; distal serrae strongly retrorse but 1 or 2 at base usually antrorse	4–5 (4.6); strong; length about ¾ diameter of spine; distal serrae strongly retrorse but 1 or 2 at base antrorse

		usually antrorse	

TABLE II (continued)

Caudal fin	Strongly convex, without posterior angles; dorsal procurrent rays high	Truncate; with evident posterior angles; procurrent rays low	Truncate; with well-marked posterior angles; procurrent rays low
Total caudal rays (10 specimens each)	57–63 (59.5)	43–46 (44.7)	44–48 (46.0)
Anal rays (including rudiments)	14–16, usually 15 or 16 (15.2)	12–15, usually 13 or 14 (13.7)	12–15, usually 13 or 14 (13.6)
Pectoral rays	1, 7–I, 9; usually I, 8	I, 7–I, 9; usually I, 8	I, 8–I, 9 (75 percent have I, 9)
Pelvic rays	9 (in all)	9 (in all)	8 (9 in 1 of 52 counts)
Adipose notch	Shallow; forming a broadly obtuse angle	Deep; forming approximately a right angle, somewhat obtuse in large specimens	Rather deep; forming a broadly obtuse angle
Size and position of axillary pore	Large; below middle of humeral process	Tiny; hidden under lower edge of humeral process	Tiny; backward and downward from tip of humeral process
Black blotch near margin of dorsal fin	Conspicuous, involving first 4 or 5 rays and their membranes	Absent, a few small brownish spots or streaks on rays	Absent, a few clusters of melanophores on rays
Occipital cross band	Well developed	Absent or scarcely darker than top of head	Absent or scarcely darker than top of head
Relation of first dark saddle on back to dorsal fin	Lying mostly in front of dorsal fin; encroaching little or not at all onto soft rays	Lying mostly beneath dorsal fin; encroaching onto basal portions of at least 3 or 4 anterior soft rays	Lying mostly beneath dorsal fin; encroaching onto basal portion of 2 or 3 anterior soft rays
Dark blotch at middle of adipose fin	Black, narrow, extending to margin	Brownish black, broad, involving much of base of adipose but not extending to margin	Dusky, rather broad at base, excluded from (usually) or extending to margin
Dark bands at base and margin of caudal	Usually conspicuous and confluent in adults, faint or poorly defined in small specimens	Often well developed but not sharply contrasting, rarely confluent	Faint, not confluent

[1] Distance from notch of adipose to tip of caudal stepped into distance from origin of dorsal spine to adipose notch.
[2] The number of serrae on the pectoral spine increases markedly with size.

data on size at maturity. All of the specimens of *hildebrandi* are adults; the smallest females (28.4 to 30.5 mm.) contain large eggs. It is evident that they would have spawned in the spring of their capture, and it seems highly probable that this species breeds when one year of age. Among the specimens of *miurus*, those more than 38 mm. in standard length, with one exception, are adults, but the 10 specimens from 25 to 36 mm. long are apparently immature. It seems likely that the smaller fish are yearlings and that *miurus* does not spawn until two years of age, at least at this locality.

The body form of *hildebrandi* is well shown in the drawings (Plate I) prepared by William L. Brudon, staff artist of the Museum of Zoology.

Proportional measurements of 10 males and 10 females are given in Table I. The data for the sexes are combined since analysis shows no significant sexual dimorphism. Because of the relatively narrow size range of the specimens it is difficult to assess the relationship of size to body proportions. It is apparent from the base data, however, that in small individuals the fins and their spines are relatively longer (or higher), the eye is larger, and the barbels are slightly longer than in larger examples.

Morphologically, the relatively short pectoral spine and its associated structures are distinctive (Plate II, E); the anterior serrations are wanting or are very feeble, but the posterior serrae are few, large and strong. The number of serrations on either edge of the spine is, at least in part, a function of size. In 13 specimens of *hildebrandi* less than 36 mm. long the posterior serrae number 4 in each of 16 fins (both sides counted) and 5 in 10 fins, whereas in 13 examples longer than 36 mm. the serrae number 4 in 5 fins and 5 in 21 fins. Thus the reduced number of serrations in *hildebrandi* is correlated not only with the short spine, but also with the small size of the fish. At comparable sizes there are fewer serrae than in specimens of *eleutherus* and of *miurus* (Table II). The humeral process, which is very short, ends in a flat projection which forms an angle of more than 45° (Plate II, F). The minute axillary pore lies below and behind the tip of the humeral process.

The dorsal fin has, in addition to an embedded plate-like spine, one well-developed but short spine and 6 soft rays (I, 5 in one of 26 specimens). In 11 specimens, the caudal fin has from 15 to 19 (most often 17) unbranched rays above, from 15 to 17 (usually 15) branched rays, and 12 to 14 simple rays below. The total caudal counts are as follows: 44 in 1, 45 in 3, 46 in 4, 47 in 2, and 48 in 1. The anal rays (including all anterior rudiments, as determined by dissection; the last ray double at base) range from 12 to 15, of which 3 to 5 (usually 4) are unbranched, as follows: 12 in 3, 13 in 6, 14 in 15, and 15 in 2. The pectoral rays (counted on both sides) number I, 8 in 13 and I, 9 in 39 fins. The pelvic rays number 8 on each side in 25 specimens and 9–8 in one. The holotype has 17 + 16 + 12 = 45 caudal rays, iii + 10 = 13 anal rays, I, 9–I, 9 pectoral rays, 8–8 pelvic rays, and has 5 posterior serrae on each pectoral spine.

Coloration.—The back and sides are dull straw-color, grading to dull cream on the under surface. The entire top of the head is heavily sprinkled with melanophores. Except for 4 dark saddles, which are as well pigmented as is the top of the head, the back is lightly dusted with melanophores. The

first 3 saddles become broader but more diffuse on the dorsolateral surface and lose their identities at the axial streak. The first saddle extends from a point slightly ahead of the dorsal origin backward to the third soft ray, and upward on the anterior rays to, or almost to, the tip of the dorsal spine. The dorsal fin is otherwise immaculate except for a few scattered clumps of melanophores centered on the rays about three-fourths of the distance from their bases. The second saddle crosses the interdorsal space from just behind the base of the first dorsal to or slightly behind the tips of the depressed dorsal rays. The third saddle, which is subequal in width to the second, lies at the center of the adipose fin. In most specimens this blotch is excluded from the marginal half of the fin, or is much narrowed near the margin, but in an occasional individual it enters the margin broadly; elsewhere, except near its origin, the adipose is immaculate. A diffuse bar that extends across the caudal base from the tips of the upper procurrent rays to the base of the lower procurrent rays is confluent anteriorly with a loose sprinkling of melanophores on the side and, ventrolaterally, with even more-scattered pigment spots. The broad but diffuse submarginal band on the caudal fin and the even fainter vertical band near the middle of this fin are confluent dorsally in some specimens. The whitish lower fins are immaculate except for a scattering of melanophores on the upper anterior surface of the pectoral and well out on the middle anal rays. The lower surface and the mental barbels are immaculate. The other barbels are light but have a few dark pigment flecks. The lower cheeks are scarcely pigmented; the opercle is almost as dark as the top of the head. The postorbital dark bar is either scarcely discernible or absent.

COMPARISONS AND RELATIONSHIPS.—Among the described species of *Schilbeodes*, *hildebrandi* is most similar to *eleutherus* and *miurus* (Table II). From both, the new species differs notably in the structure and strength of the pectoral spine and the humeral process (Plate II), in the length of the dorsal spine, in pelvic ray count, in size and coloration, and in other characters. The similarity of *hildebrandi* with *eleutherus* and its contrast with *miurus* in the form of the caudal fin, in the number of caudal and anal fin rays, in the relative position of the adipose notch, and in certain basic elements of color pattern, are interpreted as indicative of the closer genetic relationship of *hildebrandi* with *eleutherus*. They are regarded as allopatric species rather than as subspecies because of the marked morphological distinction and the wide geographic hiatus (which is probably real rather than the result of inadequate collecting).

HABITAT AND HABITS.—The 26 known specimens of *hildebrandi* were taken, together with 18 specimens of *miurus*, in a night collection between 8 and 10 P.M. Most streams in the area were high and turbid at the time, but Brushy Creek was near normal level and was quite clear. Where seined it was from 30 to 60 feet wide, had a maximum depth of about 6 feet, and the bottom was mostly sand, with clay and silt in the backwaters and gravel on the riffles. The gradient was steep, with frequent riffles; the water temperature was 63°F. The fish population was fairly large, including a curious mixture of Gulf-Coastal and upland species. Most of the madtoms were taken on a shallow, swift riffle having a bottom of small pebbles. Each

downstream-sweep of the 15-foot seine on this riffle yielded several specimens. In nearly 2 hours of previous seining in quieter water over a predominantly sand bottom only a few specimens were secured. Unfortunately, in the faint glow of dimming headlights, it was not recognized that two species were being taken, but it is obvious that both species were concentrated together on the riffle. It may be presumed that active feeding was in progress since the stomachs are mostly well filled and the combination of swift current and lack of protective objects offered no resting shelter.

SUMMARY.—*Schilbeodes hildebrandi,* known only from a clear, steep-gradient tributary of the Homochitto River, southwestern Mississippi, is apparently an isolated representative of the large and distinctive fish fauna of the uplands of Eastern United States. The smallest known species of the Ameiuridae, *S. hildebrandi* is closely related to, but fully distinct from, *S. eleutherus,* a species from the Ohio (including the Tennessee) and Arkansas river systems and tributaries to western Lake Erie. *Schilbeodes gallowayi* Fowler is placed in the synonymy of *S. eleutherus.*

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A New Species of *Desmognathus* from Alabama

By Sherman C. Bishop and B. O. Valentine

THIS species is based on a series of about fifty specimens collected in Tuscaloosa County, Alabama, by R. L. Chermock, B. O. Valentine and J. C. Nicholls, Jr.

Desmognathus **chermocki,** n. sp.

Diagnosis.—A small but stout *Desmognathus* with vomerine teeth in both sexes; tail not keeled; venter very light, the scattered chromatophores rarely forming a mottled pattern; dorsal band tan or yellowish, with irregular edges and limited laterally by dark pigment; an irregular series of dark dots or small blotches within the dorsal band, rarely with a suggestion of a herring-bone pattern.

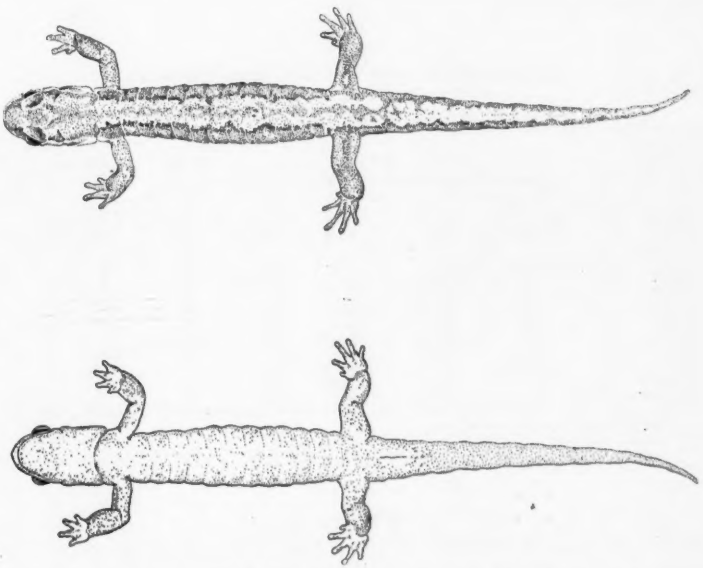

Fig. 1. Upper. *Desmognathus chermocki,* n. sp., ♀ dorsal aspect. Lower, same, ventral spect. Hurricane Creek, Tuscaloosa County, Alabama. Actual length 47 mm.

Description.—Snout bluntly rounded in female, slightly narrower and more pointed in the male; tip of lower jaw of male more pointed than in the female and with a transverse ridge back of margin; sides of head in both sexes swollen; a short vertical groove from angle of jaw to a sinuous groove extending from eye to vertical extension of gular fold; sides of abdomen broadly rounded between the legs, flattened above and below and with an impressed, median dorsal line; tail subquadrate in section near base, nearly

circular in section and tapering distally; legs stout, toes 4–5, those of the fore feet 1-4-2-3 in order of length from the shortest, those of the hind feet 1-5-2-4-3, widened and flattened basally and slightly webbed; vent of male with a narrow raised margin, no papillae but with sides having oblique folds; vent of female with a slit-like, sinuous opening, the sides with broad but shallow folds; costal grooves usually 14, counting 1 in axilla and 2 that run together in the groin; 3 or 4 intercostal folds between the toes of the appressed limbs; vomerine teeth in short irregular series, widely separated from each other and from parasphenoid patches, 5 to 7 in number in the males, 5 to 9 in the females; parasphenoid teeth in 2 elongate, club-shaped patches well separated from each other; premaxillary series in males noticeably enlarged and fang-like; maxillary teeth in males approximately 20 on each side and with pits or scars of 3 or 4 additional ones posteriorly; mandibular teeth about 20 in each series and extending posteriorly to a point opposite hindmost maxillary teeth; nasal spines in contact in all specimens studied; fontanelle elongate oval.

Measurements and Other Characteristics

Hurricane Creek, Tuscaloosa County, Alabama

Chicago Nat. Hist. Mus. No.	Sex	Length in mm. Total	Snout-vent*	Tail	Head	Costal Grooves	Folds between Appressed Limbs
59232	♂	49.5	27.5	22.0	6.75	14	3½ (type)
59233	♀	47.0	26.5	20.5	5.50	14	3½ (allotype
S.C.B.							
1286	♂	51.0	25.5	25.5	6.0	13	4
1287	♂	52.0	26.0	26.0	6.5	14	3½
1288	♀	50.0	26.0	24.0	6.5	14	3¾
1289	♀	55.0	27.0	28.0	7.0	14	4
1290	juv.	27.0	15.0	12.0	4.0	14	3
1291	juv.	36.0	19.0	17.0	4.7	14	3½
1292**	♀	57.0	27.0	30.0	7.0	14	4
1293***	juv.	25.0	15.0	10.0	4.0	14	2½

* Measured to posterior end of vent.
** Largest specimen.
*** Smallest transformed specimen.

Color of dorsal band dull yellow or tan, the sides irregular or with notches representing remnants of larval light spots; markings within band usually a series of dark dots or small blotches, rarely with a faint herringbone pattern; dark pigment of upper sides concentrated at margins of dorsal band, fading somewhat and becoming mottled on lower sides where, in some individuals, there is a row of small light dots; many specimens with a dark blotch between the eyes and in front of this a light blotch which is continuous with the small light areas surrounding each external naris; top of snout with a light spot; legs with general coloration of upper sides; venter very light in most individuals, the scattered black chromatophores rarely forming a mottled pattern; tip of tail more strongly pigmented below. Young individuals with the same general pattern as adults except that the larval light spots, defining the dorsal light areas, are more prominently developed.

TYPE LOCALITY.—Hurricane Creek, Tuscaloosa County, Alabama, 1⅛ miles E.N.E. of bridge crossing creek on Alabama State Route 116. Paratypes

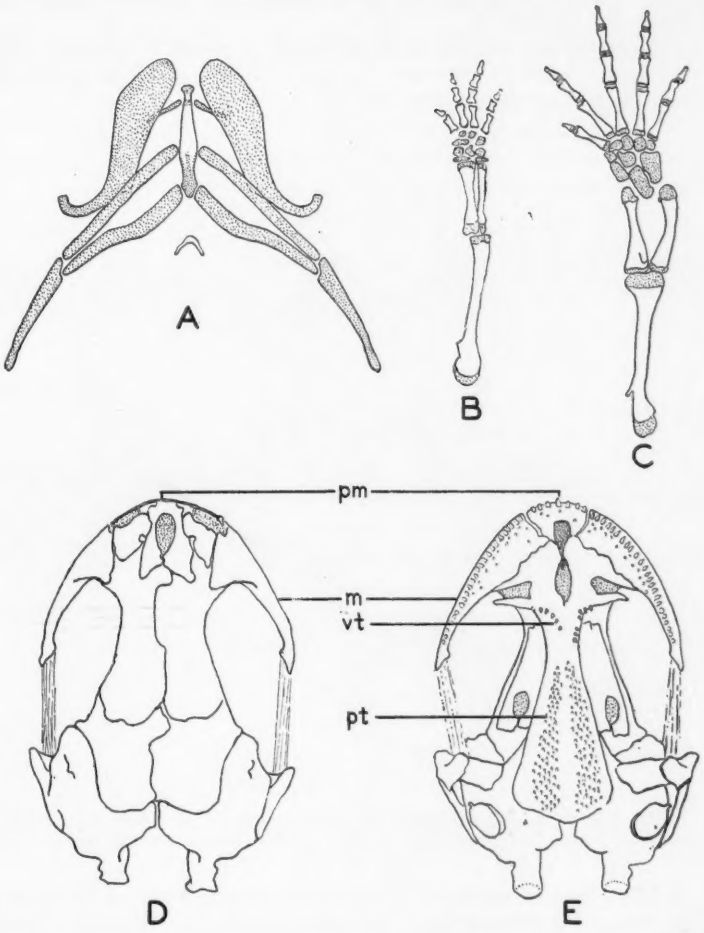

Fig. 2. ***Desmognathus chermocki,*** **n. sp. A. Hyobranchial apparatus of female (that of male similar). B. Right fore leg of male. C. Right hind leg of male. D. Dorsal aspect of skull of male. E. Ventral aspect of skull of male: pm, premaxilla; m, maxilla; vt, vomerine teeth; pt, parasphenoid teeth.**

deposited in collections of The American Museum of Natural History, New York; Carnegie Museum, Pittsburgh; Museum of Comparative Zoology,

Cambridge. Other paratypes retained in the collections of R. L. Chermock and S. C. Bishop.

In addition to the type locality, this species has been collected on the east side of Bryer Lake and in a small stream near Guthrie's nursery, all in Tuscaloosa County.

RELATIONSHIPS.—Because of its small size, retention of vomerine teeth in both sexes, costal groove count and general appearance, it is apparently related to *Desmognathus aeneus* Brown and Bishop.

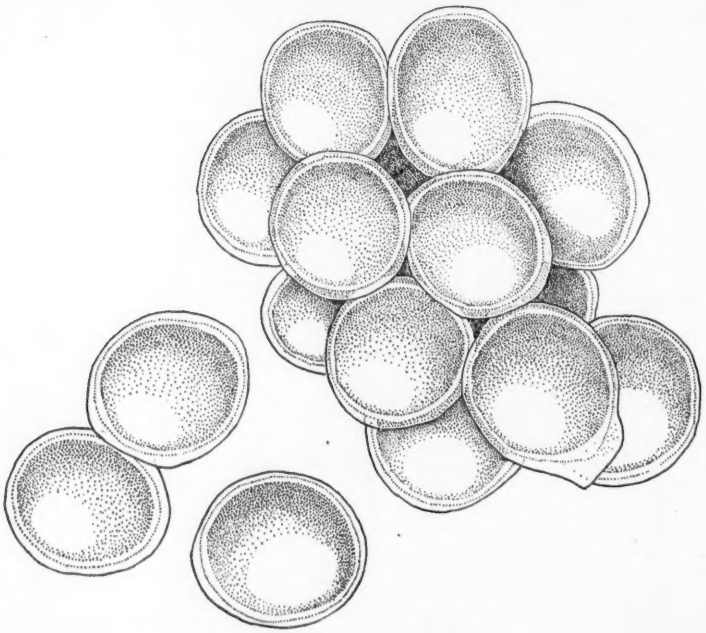

Fig. 3. Egg cluster and individual eggs of *Desmognathus chermocki*, n. sp. Hurricane Creek, Tuscaloosa County, Alabama, Mar. 30, 1948. Diameter of egg about 3 mm.

It differs from *D. aeneus* in the character of pigmentation of the venter, in the form of the dorsal stripe, in the conformation of the elements forming the hyobranchial apparatus and in the number and disposition of the parasphenoid and vomerine teeth. It somewhat resembles *D. ochrophaeus carolinensis* Dunn in the irregular edges of the dorsal stripe but differs in size, pigmentation of venter and in certain structural features.

HABITAT AND HABITS.—The majority of the specimens were found beneath leaves and debris along the margins of heavily-shaded seepage areas on the sides of hills and ravines. The forest cover of the ravines consisted of mixed stands of star gum, magnolia, oak, pine and scattered yellow birch

and poison sumach. In the same general area specimens of the following named species of salamanders were collected: *Desmognathus f. fuscus, Eurycea b. bislineata, Plethodon g. glutinosus* and *Pseudotriton ruber* ssp.

Females curled about clusters of eggs were found March 30, 1948, occupying little cavities in rotten logs in the run-off from a spring draining into Hurricane Creek and also beneath accumulations of leaves at the margins of seepage areas.

Individual eggs have a diameter of 2.25 to 2.50 mm. and with the envelopes, 3 mm. The eggs are creamy white and attached to one another by extensions of the outermost of the two envelopes. There was no evidence of a stalk for the attachment of the cluster to the walls of the cavity. The several clusters contained, respectively 16, 14, 12, 10, 10, 8, and 5 eggs.

ACKNOWLEDGMENTS.—The specimens were received through the kindness of R. L. Chermock, for whom we name the species. The drawings were made by Carolyn Fallon, staff artist, Department of Biology, University of Rochester.

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The Development of *Eleutherodactylus latrans*

By David L. Jameson

THE mode of embryologic development and the taxonomic position of the barking frog, *Eleutherodactylus latrans* (Cope), have long been questioned. Strecker (1910) reported the species as having an aquatic development but Wright and Wright (1949) have concluded this record to be in error. Noble (1925) reviewed the taxonomic status of various members of the genus *Eleutherodactylus* and pointed out that the barking frog was the only member of the genus reported without a terrestrial embryonic development. Piatt (1934) reviewed the morphological position of the species and concluded that it was definitely a member of the genus *Eleutherodactylus* on the basis of the T-shaped terminal phalanges. Cope (1878) considered the species to be an aquatic breeder. More recent workers (Livezy and Wright, 1947) assume the form to have a terrestrial development, although the life history of *Eleutherodactylus latrans* has not previously been reported.

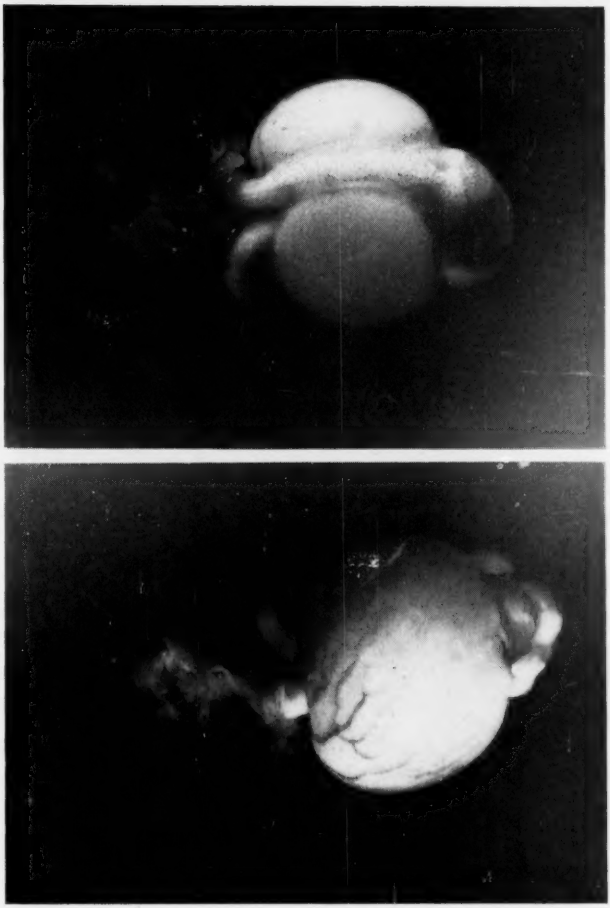
On the night of April 29, 1949, George Krise, Neal Phillips, Jack Fouquette, and I listened to a male barking frog calling from the side of a canyon near the Medina River in Bandera County, 18 miles west of Medina, Texas. We were able to trace the call to a large rock from under which the amphibian was captured. There was no doubt that it was the calling individual. Under this same rock we found a cluster of 67 eggs in a small pocket of the very rich soil usually found under the rocks of the Edwards Plateau. The pocket was about 4 inches deep and filled with a mixture of eggs and mud. Capture of the male under the rock with the eggs suggests that the male remains with the eggs until they are hatched. The moisture was possibly formed by the urine of the male *Eleutherodactylus*. It is difficult to explain otherwise the presence of so much moisture in the pocket when it had not rained in the locality for several days. The soil around the pocket was quite firm and devoid of moisture. This dry condition prevailed under other rocks turned in the area at that time. This leads to the hypothesis that the male *Eleutherodactylus latrans* may prevent dehydration of the eggs by wetting the egg mass with the contents of his bladder.

Lynn (1942) reported that the females of *Eleutherodactylus nubicola* remain with the eggs throughout development. Goin (1947) reported no such phenomena in either the male or female *Eleutherodactylus ricordii planirostis*.

The barking frog eggs were removed to Austin and placed in containers modeled after those used by Goin (1947). The receptacles consisted of flower pots, filled with sand, set in a bowl of water and covered by a piece of glass. They were observed several times each day.

More than half of the original 67 were dead when they reached the laboratory. This was probably caused by the heat, the delay of three days before they could be properly cared for, and by the unnatural and undoubtedly rough treatment that they received during this period.

In the laboratory the remaining eggs were invaded by molds, which covered them to such an extent that observation was quite difficult. The



Dorsal and ventral views of the developing embryos of *Eleutherodactylus latrans*. The embryo is approximately seven days old. The expanded tail is dissected away and can be seen on the posterior end of the embryo. Note the vascular system on the ventral view, the absence of gills or gill slits and the early development of limb buds with the accompanying differentiation of digits.

molds apparently killed the embryos and the *Drosophila* in the laboratory devoured many specimens before they could be positively identified as dead. By carefully separating a few of the eggs and using every precaution certain observations were possible.

The eggs when first observed in the laboratory in Austin (Plate I) were in a stage comparable to that of seven days of development in *Eleutherodactylus guentheri* as described by Lynn and Lutz (1946). The limb buds were evident, and there was slight differentiation of fingers. The mouth was formed, and olfactory pits were seen. The heart was beating. The tail was well expanded and quite vascular; it completely surrounded the developing embryo. There was no evidence of gills or gill slits. The operculum was not present. The intestinal tract lacked the typical amphibian coiling.

The development continued in a typically *Eleutherodactylus* pattern through various stages until the formation of an "egg-tooth" just before the last specimen died on June 2, 1949. In an attempt to prevent the invasion of molds the rigid short-interval observations suitable for such studies were not made, and for that reason this last specimen was destroyed by mold and devoured by *Drosophila* before its death was discovered.

Several factors must be considered in setting the total period of development. The eggs were probably in a cooler environment in the laboratory than in nature. To make any estimate of the total time of development it must be assumed that the development before the eggs were found proceeded at a rate comparable to that after they were found. From a comparison of the observations on the one individual that survived almost to the time of hatching with the data on other forms, I feel that the total period of development from fertilization to hatching may vary from 25 to 35 days.

The expanded tail, lack of gills and gill slits, absence of operculum, and lack of intestinal coiling are typical *Eleutherodactylus* embryonic characters. The formation of an "egg-tooth" is typical of terrestrial developing forms. It can be said conclusively, therefore, that *Eleutherodactylus latrans* does not go through an aquatic tadpole stage in development. The terrestrial development of the zygote of this species is similar to the terrestrial development of other species assigned to the genus *Eleutherodactylus*.

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Courtship and Egg Laying of Captive *Testudo denticulata*

By ROBERT SNEDIGAR and EMIL J. ROKOSKY

THE arrival in the Chicago Zoological Park of three *Testudo denticulata* Linneaus, a large male and 2 females, one of which was about the same size as the male, seemed an event of no particular importance. They were placed in the large 30-foot square cage in the center of the Reptile House where a motley collection of painted turtles, water snakes, coachwhips, pilot blacks, several iguanas, some large pythons, and assorted reptiles live in relative harmony. They promptly took off in different directions.

Some hours later, the large female and male were noted approaching one another in the far corner of the cage. When still some distance apart, 5 feet perhaps, the male began a curious head-bobbing to which the female responded. It consisted mostly of a forward vertical jerk but there were also occasional lateral movements. The whole performance was apparently like the head-bobbing of *Gopherus agassizii* as described by Miller. The bobbing continued after the pair had met but with less excitement and seemed definitely a recognition signal. This greeting ceremony has been observed many times since, but it should be noted that the other species of chelonians in the cage are ignored and receive no salute. Some weeks later, however, when a smaller female was added to the group, she was greeted in characteristic fashion. Bobbing as observed was always initiated by the male. Females meeting pay no attention to one another.

We had not had the tortoises many weeks when, on opening the house one morning, the junior author was considerably puzzled to find the source of curious, hen-like noises. At times, a crate of chickens is left in the cage corridor for python food, and it was at first assumed that such a delivery had been made. But there were no chickens. The noise continued but was difficult to trace. Finally, after even the adjoining grounds had been inspected, attention was turned to the last possible place—the center cage. There, the male tortoise was seen pursuing the large female and giving vent to his amorousness vocally. When the cage was opened, the sounds were much

more audible and of considerable range of volume and tone. As heard then and later, it seemed to us to resemble, more than anything else, the efforts of an amateur ventriloquist to imitate the noise of a hen just teaching a brood of chicks to scratch. A rhythmic pulsation of the throat was very marked as the sounds were produced.

The male's intent was clear, his courtship urgent and not unmusical, but the female was not responsive and kept on ambling about the cage trying to elude his importunity. However, the pair may possibly have mated in the early morning or late afternoon of this or other days and the event escaped observation. This attempt at mating happened about the first of May and it was noted some weeks later that the male, although at times courting the smaller females, paid little attention to the big one.

On October 3, the large female was seen digging with the hind feet in the gravel covering the deep soil in the bottom of the cage. She did not persist but gave up shortly after penetrating to the soil proper. The spot selected was close to a large plant that had been copiously watered the day before, and moisture conditions may not have been to her liking. The next day, sometime during the lunch hour, she again began digging in another spot. Slow, seemingly ineffective movements of the hind foot rolled bits of gravel and soil out of the hole. The feet were used alternately, and in the course of a couple of hours, the size of the two piles of dirt to right and left of the hole indicated her movements were not as futile as they seemed. By three o'clock, the hole seemed to have reached its maximum depth and the reaching down brought out very little soil. The tortoise then rested with a hind foot on either side of the hole and, very shortly, the swollen cloaca, hanging down into the excavation and moving slowly from side to side, was easily seen.

Continuous observation was not possible but we were able to see the laying of one egg. Some time and straining was necessary to expel it and its size brought immediate speculations on how such a large object could pass between carapace and plastron. After a few minutes rest, the tortoise began to pull soil and gravel back into the hole with alternate movements of the hind legs. In a little more than an hour, the surface was level. Even after we had picked up the female and set her down a short distance away so we could claim the eggs, the movements of the hind legs continued. The hole was about 4 inches deep and in the bottom, side by side, were 2 eggs of almost identical weight but dissimilar proportions. Measured with calipers, one was 50 by 37 mm. and weighed 42 grams; the other was 61 by 32 mm., weight, 43 grams. The egg shells seemed brittle rather than leathery.

A little less than two months after the egg-laying above reported, places where digging in the gravel had been started were noted. A day or so after, the same large female was seen digging. With movements similar to those previously noted, she dug for about a half hour and, seemingly discouraged by hard soil beneath the gravel, gave up the effort and ambled off. The next day, there were numerous small holes, none of any great depth, scattered about the cage. The female wandered about, dissatisfied, trying new places. After she had worked on a hole for more than an hour and then given it up, we decided that fine damp sand might prove a more satisfactory and work-

able medium; and she was taken to the basement to a large sand bin. In parts of this the top 2 or 3 inches of sand were fairly dry but underneath was a good body of moist sand. One end of the bin was sprinkled so as to be still more moist.

A four-day stay in the sand bin was without results. She wandered about but there were no indications whatever of digging. On December 5, she was returned to the center cage. Almost immediately she resumed her old wandering habit and started numerous abortive holes. On December 7, she was already at work at nine o'clock on a hole close to the large rockwork of a corner. She continued patiently all morning and was still at work at noon.

On our return from lunch at one, three eggs were visible in the hole. She seemed to be pushing them down with digging motions of the feet. Shortly after, she began covering and by two o'clock, the surface was smooth again. When the eggs were removed, they were found to be 4 in number, lying almost in two layers with the lowest one on end. The maximum depth of the hole (which was larger at the bottom than at the top) was 5 inches. The surrounding soil was fairly dry; that in the hole rather moist.

The eggs in this clutch were 50x37 mm., 44 g.; 53x36 mm., 43 g.; 50x35 mm., 41.5 g.; and 47x38 mm., 42 g. They were placed in an incubator in moist sand with the two previously laid.

After the eggs had been stowed in an incubator, attention was turned to the female. The first glance showed the hitherto disregarded notching of the rear margin of the plastron through which the eggs had passed. This notch is part of a nearly circular area measuring 45 mm. from side to side and front to back (distance from margin of notch to inner rim of carapace). When it is considered that one egg was 38 mm. in diameter, it is obvious that there was little room to spare.

The gap between plastron and carapace in the male is different in shape from that of the female. It is long and relatively narrow, measuring 60 by 25 mm. The carapace of the female comes down almost vertically at the back and its edge is sharp; that of the male is rolled under at the bottom. The plastron of the female is only slightly depressed; that of the male markedly so. The length of the female carapace, calipered, is 246 mm.; that of the male, 244 mm. The weight of the female is 6 pounds; that of the male, 5.

The plastrons of the two smaller females are not depressed and the opening between the anal plates of the plastron and the rear marginals of the carapace seem intermediate in shape between the laterally elongate gap of the male and the circular egg notch of the large female. In the larger of the two, the opening is 40 mm. from side to side by 22 mm. front to back; in the smaller, 40 by 20 mm.

Their weights are respectively, 3 pounds, 1 ounce and 2 pounds, 8 ounces.

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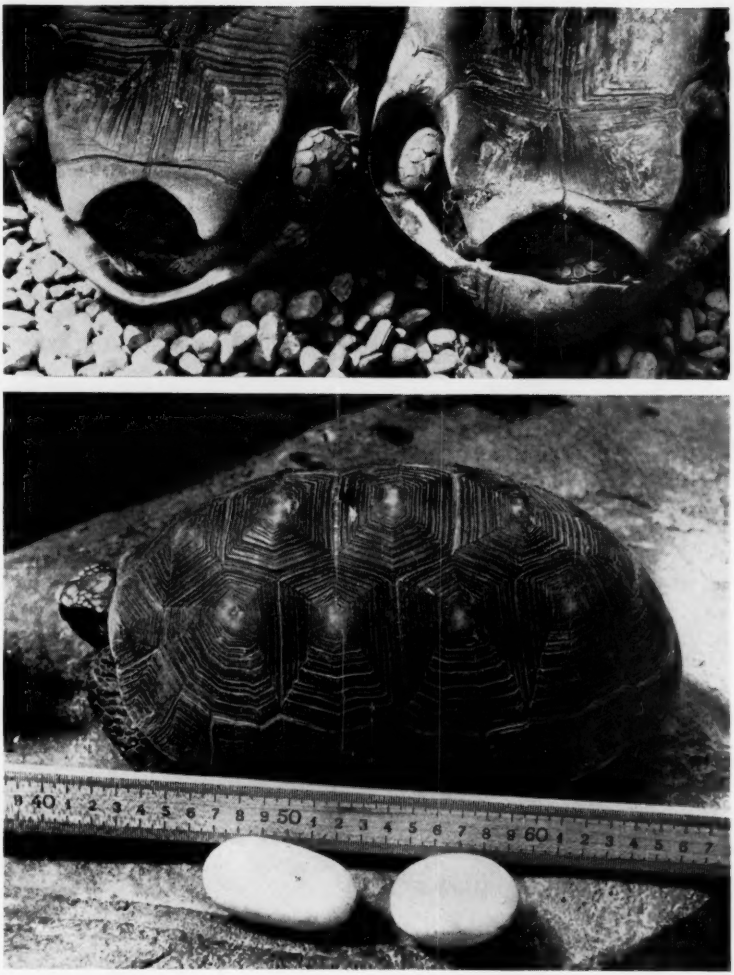

Upper figure, differences between ♀ (left) and ♂ (right) in posterior opening of the shell.

Lower figure, relative size of tortoise and freshly laid eggs.

Development of Spade-foot Toad Larvae under Laboratory Conditions

By Robert C. Burgess, Jr.

OBSERVATIONS of the rapid development of the larva of the spadefoot toad, *Scaphiopus hammondii,* on the west side of the San Joaquin Valley, Fresno County, California, led me to conduct an experimental study in the laboratory at Fresno State College. Water taken from temporary rain pools in which this species normally breeds, and tap water from the laboratory for control, were used in this study.

The study was initiated February 18, 1947. A search was made for eggs and tadpoles in the ten pools occurring in an area of 2 acres, but no eggs or tadpoles were observed. On February 20, 1947, a return trip was made and a complete search of every pool was made for eggs or tadpoles but none were found. Another visit was made February 25, 1947. Seven of the 10 previously visited pools had dried up but in the remaining 3, minute black tadpoles were found. Comparison of later tadpoles taken indicates that the eggs were probably laid February 21, 1947, one night after the second search was made.

At the time the tadpoles were collected the average size was 7 mm. over-all length, with a relation of head and body at 2.5 mm. and tail at 4.5 mm., and the widest part of the body 2 mm. There was very little range of variations, with the maximum 8 mm. and the minimum 6 mm. over-all length.

Establishing Laboratory Conditions

Seventy specimens were collected from 3 pools and were brought back to the laboratory. The 70 specimens were evenly divided between 2 aquaria 20x12x7½ inches.

One aquarium was filled with ordinary tap water from the laboratory and the other with the alkaline water brought from the field. The water in which these tadpoles were found on the west side of the San Joaquin Valley is a highly colloidal solution that never settles out to be clear. The pools are formed on a fine clay soil and the water is a dirty brown color as a result. From the pH values and chemical analysis it may be seen that the water from the field is much more alkaline than the tap water.[1] A chemical analysis of the two types of water follows:

	Tap Water	Field Water
pH	7.95	8.97
Phosphate	3.6 ppm.	10.25 ppm.
Calcium	68.0 ppm.	85.00 ppm.
Carbonates	0.0 ppm.	89.0 ppm.
Bicarbonates	246.0 ppm.	1350.0 ppm.
Chlorides	26.79 ppm.	970.1 ppm.
Total Solids	357.3 ppm.	5501.33 ppm.
Dissolved Solids	357.3 ppm.	3590.33 ppm.
Suspended Solids	0.0 ppm.	1910.0 ppm.

[1] Chemical analysis was performed under directions of H. J. King, Professor of Chemistry, Fresno State College.

Algae from the field and *Elodea* of equal amounts were added to each aquarium. The aquaria were placed on 2 tables 10 feet from the west windows to obtain the same light factors in each. A thermostat and aerator were placed in each aquarium so that uniform temperature and adequate aeration were secured.

Development of Larvae

For the first two days the tadpoles retained their black appearance, but on the third day it became apparent that they were losing their black color and becoming brown. They seemed to eat algae constantly. Their growth was especially noticeable during the first week.

At ten days of age, the tadpoles were observed coming to the top of the water and taking in oxygen. This behavior was probably not induced by a lack of oxygen since the aerator functioned efficiently. It is thought that the lung buds were forming at this early date and that the tadpoles then begin to take atmospheric oxygen.

When the tadpoles were twelve days old, fairy shrimp, *Branchinecta* sp., were abundant in the pools in the field so some were brought into the laboratory. The tadpoles were observed eating these crustaceans greedily, with as many as 10 to 15 tadpoles feeding on one fairy shrimp. The same number of fairy shrimp were added to each aquarium. Dead tadpoles were introduced into the aquaria and it was found that the living ones would feed on them at this age. They would not eat mosquito larvae. It is significant that these creatures are carnivorous at so early a stage.

After the first two weeks, the tadpoles in the alkaline water showed a greater amount of growth than did the tadpoles in the fresh water (see the table of measurements).

On March 10, 1947, twelve days after the tadpoles were brought in from the field, the largest tadpole from the alkaline water was measured and found to be 55 mm. in over-all length (head and body 26 mm. and tail 29 mm.). On the thirteenth day, rear leg buds appeared on this large tadpole. Two days after the rear leg buds appeared, the spade on each foot was clearly visible. At this time it was first noticed that the pupils of the eyes were starting to take on a vertically elliptical shape.

Nine days elapsed beween the first sign of rear leg buds and the appearance of the front legs. When the front legs appeared, the tail was reduced to 18 mm. in length. Within three days it was reduced to 1 mm. This first toad completed its aquatic development in twenty-five days, a remarkably short time. When completely metamorphosed, it measured 22 mm. from snout to anus, a reduction of 33 mm. in over-all tadpole length. The above description is of the most accelerated tadpole and is not representative of all the specimens.

Tadpoles in the alkaline water maintained a much lighter color than those in the tap water. It may be that this is a result of light factors, which deserves further investigation.

All but 7 tadpoles in the alkaline water aquarium underwent complete metamorphosis. None of the tadpoles in the fresh water aquarium ever attained more than 25 mm. (over-all length), and none transformed.

Growth was accelerated for the first two weeks in the laboratory as compared to the field growth. This was presumably the result of the higher temperatures in the laboratory. After three weeks, the diurnal temperatures in the field attained and then surpassed those in the laboratory. The tadpoles in the field later equaled, then surpassed in size the tadpoles in the laboratory.

Measurements of Laboratory Specimens

The following measurements in millimeters were taken from preserved specimens (abstracted from my much more complete notes)

		Length (Over-all)	Head	Tail	Widest Part of the Body
2–27–47	Tap Water	7.5mm.	3 mm.	4.5mm.	2 mm.
	Field Water	7.5	3	4.5	2
3–1–47	Tap Water	11.5	5.5	6	3
	Field Water	10	4.5	5.5	3
3–3–47	Tap Water	16	7	7	4.25
	Field Water	12.5	6	6.5	4.0
3–5–47	Tap Water	18	7	11	5
	Field Water	16.5	6	10.5	4
3–7–47	Tap Water	19.5	7.5	12	5
	Field Water	18.5	7	11.5	5
3–19–47	Tap Water	20	8.5	11.5	6
	Field Water	28	12	16	8
4–2–47	Tap Water	21	9	12	7
	Field Water	30	15	15	8
4–16–47	Tap Water	25	10	15	7
	Field Water	35	13	22	10

Summary

Growth in the colloidal solution containing a large proportion of chlorides, carbonates and bicarbonates proceeded at a more rapid rate than growth in the tap water. It is suggested that further attention be devoted to the relationships of these chemicals to the development of the larval stage.

The minimum length of larval period in the laboratory was twenty-five days. The mean length was fifty-one days. Twenty per cent of the tadpoles had not completed metamorphosis when the experiment was concluded. None of the tadpoles in the freshwater aquaria transformed.

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A New *Atractaspis* (Mole Viper) from Palestine

By George Haas

THE genus *Atractaspis,* thus far known from Africa and Southern Arabia only, was found some years ago at En-Geddi on the western side of the Dead Sea, where Dr. Mendelssohn of Tel-Aviv obtained a damaged specimen. Several years later I obtained an unlabelled specimen of the same species from an old school collection in Jerusalem that was almost twice as large as the first. As this collection contained Palestine specimens only, it may be assumed that the second specimen is also of Palestinian origin. This is designated as the paratype of the new species. It corresponds in almost every detail with the first small specimen from En-Geddi, which is designated as the type in order to fix the type-locality. The better preservation of the larger specimen enables me to give a full description.[1]

Atractaspis ***engaddensis,*** new species

Types.—Type and paratype in the collection of the Hebrew University, Jerusalem, Israel.

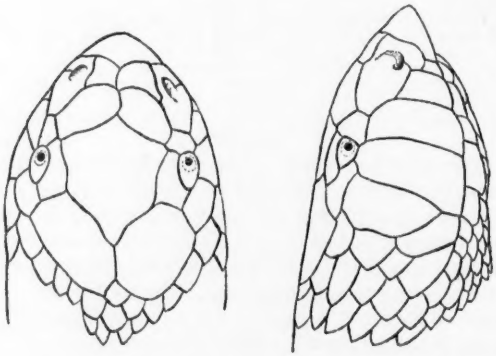

Fig. 1. Dorsal and lateral views of head of paratype of *Atractaspis engaddensis,* new species.

Description of Paratype.—Snout rather cuneiform, moderately pointed. Portion of rostral, visible from above, equalling the distance from tip of rostral to tip of frontal. Suture between internasals slightly shorter than suture between prefrontals. Frontal longer than broad, its distance from tip to snout equalling ⅔ of its length, and being less than the length of the parietals; length of the parietals equalling the width of the frontal; one supra-ocular; no subocular; one preocular and one postocular; temporals 2-3,

[1] The late Mr. J. Aharoni published, on hearsay, a note on the above mentioned *Atractaspis* from En-Geddi under the name *A. aterrima,* a species from Central Africa.

the lower of the first series very large, wedged in between the fourth and fifth labials; 7 upper labials (the last scalelike), third and fourth (or fourth alone) entering the eye, fourth largest, first smallest; first lower labial in contact with its fellow behind the symphysial; 3 lower labials in contact with the chinshields; fifth lower labial very large, second very small; 10 lower labials; a single pair of very large chin shields; 11 series of scales between the chinshields and the first ventral; scales at midbody in 27 rows; 264 ventrals; anal single; subcaudals 36, single, and with an endspur; tenth subcaudal asymmetrically paired.

NOTES ON TYPE.—In the type the preocular shows a circular furrow, which is less visible in the paratype. The temporals are 2–4 (instead of 2–3). The colour is dark brown (probably formerly black). The length is approximately 650 mm., with tail 60 mm. The much damaged type from En-Geddi is approximately half the size of the paratype. It has 277 ventrals, 39 subcaudals, and 27 scale-rows.

COMPARISONS.—Boulenger's *Atractaspis andersonii* (*Melanelaps macphersoni* Wall) from southwest Arabia, which is geographically the nearest related species, exhibits the following main differences from *engaddensis*: frontal as long as parietals; scales in 23 or 25 rows; ventrals 219–243, subcaudals 28–30; nasal fully divided, the naris in the suture (in *engaddensis* only the lower half divided); preocular rather elongated. *Atractaspis andersonii* seems to be the nearest relative to the Palestinian species. It is to be noted that *Melanoseps* Boulenger (1920), is a *lapsus calami* for *Melanelaps* Wall.

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List of Geckoes Known to Occur in the Colony of Hong Kong

By J. D. Romer

THE four species of geckoes mentioned by Smith (1935) as occurring in Hong Kong are *Hemidactylus frenatus* Duméril and Bibron, *Hemidactylus bowringi* (Gray), *Platyurus platyurus* (Schneider) and *Gekko chinensis* Gray. Since my arrival here in September, 1947, however, observations have shown that it is now necessary to revise this list, in which respect these notes are offered. It is only right to add that I have collected more frequently on Hong Kong Island than in other parts of the Colony, and although a good deal of collecting appears to have been done here by various people in the past, there is need for still more before it will be possible to draw up an accurate list of the species of reptiles now inhabiting the Colony.

I will comment first on the four species mentioned by Dr. Malcolm Smith:—

Hemidactylus frenatus Duméril and Bibron.—I have been unable to find a single specimen of this gecko and there appears to be only one record of its occurrence, namely, that of the type of *Hemidactylus pumilus* Hallowell, said to be in Washington and to have come from Hong Kong. On making enquiries from the U. S. National Museum, however, I was informed that the type of *Hemidactylus pumilus* is not in that institution and that there is no record to prove that it ever has been. In view of this, therefore, there is nothing I know of to justify the inclusion of this species in the herpeto-fauna of Hong Kong.

Hemidactylus bowringi (Gray).—This is by far the commonest species on Hong Kong Island and in Kowloon. It is undoubtedly a house gecko, but is also frequently found on trees, the exterior of buildings, and in other outdoor situations. A point of interest with regard to its occurrence on trees is that it is found living on the same trees as the larger species (*G. chinensis*) referred to below.

Platyurus platyurus (Schneider).—Pope (1935) gives the distribution of this species in China as: "Lilong in Kwangtung." He adds, however, that it is also known from Hong Kong and remarks that:—"It would be gratifying to receive confirmation of the somewhat questionable Hong Kong record. New material from China would likewise be most welcome." For my part, I can only add that so far I have failed to find a single specimen and consider that, if the Hong Kong record is questionable, it is desirable to exclude it from the list until such time as there may be definite evidence to justify its inclusion.

Gekko chinensis Gray.—There is no doubt as to the occurrence of this species and in Happy Valley (Hong Kong Island) it is quite common on the larger trees, where it may easily be observed after dark by the aid of a flashlight. I have also seen specimens at Tai Tam Tuk (Hong Kong Island) on the walls of a small derelict building and in several other localities on the Island. It does not seem, normally, to enter inhabited buildings.

The following are two additions:—

Hemidactylus garnoti Duméril and Bibron.—Pope (1935) and Smith (1935) both mention only Hainan for the distribution of this species in China, and it does not appear to have been known from Hong Kong. During 1948, however, I found this gecko on Hong Kong Island in three separate localities (Pokfulam, Tai Tam Tuk and Aberdeen), so it appears to have established itself here, though it was not abundant. None were observed inside houses.

Gehyra mutilata (Wiegmann).—This is another species like the preceding, which appears not to have been known from Hong Kong before, and which Pope and Smith mention only from Hainan for its distribution in China. During the latter part of 1948 I took three specimens on separate occasions in the same office in a building near Kennedy Town, Hong Kong Island. At present this is the only locality in which the species has been found.

The species of geckoes now definitely known to occur in this Colony, although still only four in number, may thus be revised as: *Hemidactylus bowringi* (Gray), *Hemidactylus garnoti* Duméril and Bibron, *Gehyra mutilata* (Wiegmann), *Gekko chinensis* Gray.

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Herpetological Notes

ANOLIS SAGREI IN FLORIDA.—Until recently the only known representative of the lizard, *Anolis sagrei,* in the herpetofauna of the United States has been the subspecies *stejnegeri,* which occurs on the Florida Keys. It is now possible to add a second subspecies of *sagrei* and to call attention to the probable existence of a third race within the boundaries of the United States.

Garman (1887, Bull. Essex Inst., 19: 25–50) appears to have been the first to record any representative of *Anolis sagrei* as a constituent of the Florida fauna. At that time he allocated specimens from the Florida Keys to *ordinatus,* which he considered a "variety of *A. sagrae*" (*sic*). The population at Key West, Florida, has since been described as *Anolis stejnegeri* Barbour (1931, Copeia, 1931: 87-89), and more recently has been assigned subspecific status in the species *sagrei* (Oliver, 1948, Amer. Mus. Novitates, 1383: 1–35).

Coleman J. Goin called my attention to a series of 16 *Anolis sagrei* that had been collected at Tampa, Florida, in July and September, 1947, by J. C. Dickinson, Jr., Frank

N. Young and T. Roy Young. These specimens are now in the collection of the Department of Biology of the University of Florida. In April, 1949, J. C. Dickinson, Jr., Jon Herring and I collected 41 additional specimens from four different localities within the city limits of Tampa.

The Tampa colony is now distributed for a distance of at least 3 miles along the Hillsborough River and occurs on both sides of the river. It is a flourishing colony that is actively reproducing itself and undoubtedly is now in the process of expansion. Two of the 4 adults collected in July, 1947, are females and both contain large developing eggs in the oviducts. No young individuals were seen on this date. In September, 6 of the 12 individuals collected were young of the year; 2 of the 4 adult females contained large developing eggs. In the April, 1949, collection there are 24 adult females. In all of these large developing eggs, numbering 1 to 3 per female, are present. The usual complement comprised two eggs. No young were seen at this time.

Comparison of the Tampa specimens with representatives of the three subspecies of *A. sagrei* shows that this population is similar to *sagrei sagrei* of Cuba and should be referred to this subspecies. The history of the colony is not known in detail. Workmen at the City of Tampa waterworks, where this lizard is most abundant, state that they first noticed this different kind of lizard about four or five years ago. According to a study made by A. Stuart Campbell (1935, University of Florida Publ., 1, (7): 1–37), Tampa is the largest port of importation in Florida, and the highest tonnage of imported goods comes from Cuba. It seems most likely that these lizards have been imported into Tampa unintentionally with cargos of lumber or vegetable produce from Cuba.

When Dickinson, Herring and I collected in Tampa we found *Anolis c. carolinensis* at three of the four localities where *Anolis s. sagrei* was collected. The ecological preferences of the two species in the Tampa area are similar to those noted in Bimini, Bahamas (Oliver, *supra cit.*). At Tampa, *sagrei* was found on pilings, on sections of drainage pipe, on fence posts, on boards, on the lower parts of trunks of trees and shrubs, or on the ground. On the other hand, *carolinensis* was found higher up on the trunks of trees or in the foliage of bushes and trees, although it, too, is occasionally found on the ground. The difference in activity and alertness between the two was quite apparent. An attempt was made to catch the lizards by hand. In the case of *carolinensis* this was not difficult, but few *sagrei* could be collected in this way. Virtually all of the *carolinensis* were caught by hand, whereas most of the *sagrei* were shot.

A collector has informed me that in 1941 he imported approximately 100 live Bahaman *Anolis* and liberated them within the city limits of Lake Worth, Florida. He reported that several species were represented and that the lizards were collected on San Salvador, Cat Island, and New Providence, all islands of the Bahamas. In March, 1947, he returned to Lake Worth to determine the success of his introduction. He found fair numbers of only one species, "the little one with the chevrons." This most certainly refers to *Anolis sagrei ordinatus*, the commonest reptile in the Bahamas, and is a good indication that this form, too, now belongs to the Florida fauna. So far I have been unable to visit this locality, however, and have not succeeded in obtaining specimens from any other source.[1]

Through the generous efforts of E. Ross Allen I have examined two adults, male and female, of *sagrei sagrei* collected within the city limits of St. Petersburg, Pinellas County, Florida, October 3, 1949. These specimens were collected in a park-like area, about 6 acres in size, occupied by S. W. Thompson's wild animal farm. The lizards are common within this area and are represented by both young and adults. Allen first observed the lizards here in 1946. He states that they appear to be propagating rapidly.

There are reports, as yet unconfirmed, of the establishment of still other introduced *Anolis* in Florida. Data are being gathered on all of the forms in the state and it is hoped that a complete list of the known species and subspecies can be prepared before the publication of the next herpetological check list of North America. It is also to be hoped that the indiscriminate introduction of exotic animals into the state can be effectively curtailed.—James A. Oliver, *Department of Biology, University of Florida,* and *The American Museum of Natural History, New York.*

[1] Since this paper was submitted for publication, specimens have been collected in Lake Worth and they do represent *Anolis sagrei ordinatus.*

NOMENCLATURE AND TYPE SPECIMENS OF TWO SPECIES OF *SPHENOMORPHUS* (SAURIA: SCINCIDAE).—Examination of type specimens in the Macleay Museum at the University of Sydney shows that *Hinulia pardalis* Macleay (1877) and *Mocoa nigricaudis* Macleay (1877) are distinct species. *Hinulia pardalis* is identical with *Lygosoma atromaculatum* Garman (1901), which must now be known as *Sphenomorphus pardalis pardalis* (Macleay). The trinomial is used on account of *S. p. erro* Copland (1946, Proc. Linn. Soc. N.S.W., 70: 298). New Guinea lizards previously referred in error to *Sphenomorphus pardalis pardalis* should be known as *Sphenomorphus nigricaudis nigricaudis* (Macleay). Topotypical material from Somerset, Cape York, shows that *Lygosoma* (*Hinulia*) *elegantulum* Peters and Doria (1878) is conspecific with *S. nigricaudis*, but is a distinct race. *S. n. nigricaudis* should be used for the lizards with blackish tails, and *S. n. elegantulus* (Peters and Doria) for the more uniformly coloured brownish lizards with narrow dark bars more or less developed. Confusion has been caused by the inadequacy of the original descriptions. I have treated this matter more fully in the Proceedings of the Linnean Society of New South Wales, referred to above, but this publication may not be readily accessible to American herpetologists who are now so actively engaged in the study of New Guinea reptiles.—STEPHEN J. COPLAND, *Department of Zoology, University of Sydney, New South Wales.*

NOTES ON TWO ANGUID LIZARDS.—Fitch (1935, Trans. St. Louis Acad. Sci. 29: 1–38) mentions *Gerrhonotus multicarinatus scincicauda* and *G. c. coeruleus* as having prehensile tails. It is therefore not surprising to find that *G. liocephalus infernalis* has the caudal appendage functionally thus modified. While taking photographs of a specimen from Austin, Texas, it was discovered that the lizard used its tail as an anchor while descending from an inverted aquarium on which it had been placed. When an effort was made to pose the animal in a large geranium bush it immediately wrapped its tail around one of the branches but made no effort to use its feet and seemed to be completely out of place in the arboreal habitat.

A specimen of *Ophisaurus ventralis* has been in the greenhouse of the Department of Zoology of the University of Tulsa for slightly more than a year. During this period it has been seen above ground some half dozen times. On one occasion it was 12 or 15 inches off the ground in a large *Colias* bush and was presumedly feeding on the many aphids with which the plant was infested. No indication of prehensile use of the tail was observed.—ALBERT P. BLAIR, *Department of Zoology, University of Tulsa, Tulsa, Oklahoma.*

THE ALLIGATOR IN OKLAHOMA.—There seems to be no authentic record of the alligator in Oklahoma. Occasional newspaper reports of the occurrence of this form in various parts of the state attest to man's distribution of the alligator. However, it is altogether possible that some of the reports from extreme southeastern Oklahoma represent authentic natural occurrence. The southern half of McCurtain County is coastal plain with muddy streams and extensive swamps. Here the biota includes such coastal plain forms as palmetto, cypress, *Anolis carolinensis*, and *Hyla cinerea*.

The present report lends support to the belief that the alligator occasionally wanders into southeastern Oklahoma. In July, 1949, while engaged in field work, the writer had the opportunity of examining the skull and tanned hide of an animal shot by Mr. E. M. Wagnon in Rock Creek, some 7 miles east of Eagletown. At this locality Rock Creek is but a few hundred feet on the Oklahoma side of the Oklahoma-Arkansas boundary. According to Mr. Wagnon, Rock Creek joins Rowland Fork, which then empties into Little River. Mr. Wagnon produced a photograph in support of his statement that the alligator measured 8¼ feet in length. Such a size tends to support the view of natural occurrence. The fact that Mr. Wagnon was sufficiently impressed by the incident to have a photograph taken, however, emphasizes the rarity of occurrence. It is possible that the alligator never breeds in Oklahoma but that occasional animals emigrate in from the southeast along Little River and Red River.—ALBERT P. BLAIR, *Department of Zoology, University of Tulsa, Tulsa, Oklahoma.*

THE NAMES OF THE COMMON NORTH AMERICAN GARTER SNAKE AND RIBBON SNAKE.—A transfer of the Linnaean name *sirtalis* to the ribbon snake, currently known as *Thamnophis sauritus* and the re-establishment of the name *Thamnophis ordinatus* for what has been known as the common garter snake under the name *sirtalis* auctorum, *nec* Linnaeus, is shown by Klauber (1948, COPEIA, 1948: 8ff) to be correct under accepted zoological procedure. A preliminary canvass of North American herpetologists indicates, however, that the great majority of productive students who are the users of these names are opposed to making the changes indicated, provided that action of the International Commission on Zoological Nomenclature to validate the names in their long-established senses can be taken. Correspondence with the Secretary of the Commission, Mr. Francis Hemming, indicates that action to suspend the rules of nomenclature with regard to trivial names has ample precedent.

We have accordingly proposed to the Commission that the rules be suspended to hold the name *Coluber sirtalis* Linnaeus in the sense of *Thamnophis sirtalis* auctorum, sensu Stejneger and Barbour, 1943, and further that the name *Coluber saurita* Linnaeus be established for *Thamnophis sauritus* auctorum, sensu Stejneger and Barbour, 1943. These names would be placed on the Official List of trivial names.

In this action, requesting validation of usage quite independent of the correspondence or non-correspondence with the actual sense of the original author, we are well aware that we are valuing a *continuity* principle above the "law" of priority. We feel strongly that a halt must be called to the changing of the scientific names of common species, and that *continuity* should be the guiding principle, taking precedence over priority, in the case of all those abundant or otherwise well-known forms whose names form a part of the vocabulary of non-systematists, e.g., embryologists, physiologists, ecologists, etc. That this reflects the belief and practice of many systematists in other fields than herpetology is evident from conversations with various colleagues (cf. Mayr, 1942, Systematics and the origin of species: 17). The International Rules have had the provision for their suspension as an integral "rule" (n.b., there are no "laws" of nomenclature) from the beginning. In our opinion, the establishment of an Official List of generic and trivial names no longer to be subject to change is essential if nomenclatural practice is to retain the respect even of its own practitioners.—KARL P. SCHMIDT and ROGER CONANT, *Chicago Natural History Museum, Chicago, Illinois,* and *Zoological Society of Philadelphia, Philadelphia, Pennsylvania.*

THE STATUS OF THE LIZARD *PANTODACTYLUS NICEFORI.*—The status of *Pantodactylus nicefori,* described by Burt and Burt in 1931 (Bull. Amer. Mus. 61: 360) on the basis of specimens allegedly from Bogotá, Colombia, has been open to some doubt (Brongersma, L. D., 1946, Zool. Meded., 26: 231; Dunn, E. R., 1944, Caldasia, 3: 104). Only the type and paratypes are known, and the figure of the type does not agree in all details with the description.

I have had occasion to investigate the status of various species assigned to teiid genera and of *Pantodactylus* in particular. I have examined the specimens described by Burt and Burt, and find that in their description of the type they state that the nasals are "separated by a single large frontonasal" whereas their drawing shows the nasals in contact anterior to the frontonasals. An examination of the type and paratype reveals that the drawing is correct. The presence of nasals in contact prevents the retention of this species in the genus *Pantodactylus.* Moreover, further investigation reveals that the specimens cannot be assigned to any other teiid genus. The specimens are part of the collection assembled by Prince Alexander Maximillian of Wied, and acquired by the American Museum of Natural History in 1870. The collection is of value because of the types it contains, although specimens with dubious locality data are included. Assuming the possibility that the locality data were in error, an attempt was made to place *Pantodactylus nicefori* in the family Lacertidae. It was soon evident that the type and paratype of *Pantodactylus nicefori* represented examples of *Psammodromus algirus algirus* (Linnaeus), a lacertid inhabiting France, Spain and northwest Africa. Consequently it is manifest that the type locality, Bogotá, Colombia, is an error in the cataloging or tagging of the specimens, and that *Pantodactylus nicefori* must be relegated to the synonymy of *Psammodromus algirus algirus.*—RODOLFO RUIBAL, *The American Museum of Natural History, Central Park West at 79th Street, New York 24, New York.*

FURTHER EVIDENCE REGARDING THE OCCURRENCE OF THE SALAMANDER, *ENSATINA ESCHSCHOLTZII XANTHOPTICA*, IN THE SIERRA NEVADA OF CALIFORNIA.—Stebbins (1949, Univ. of Calif. Pub. in Zool., 48, No. 6) has recently revised the genus *Ensatina*, making it a complex of seven subspecies, all under the species *eschscholtzii*.

One of Stebbins' new subspecies, *xanthoptica*, has as its main range the Inner Coast Range of California between the great Central Valley and San Francisco Bay, from east-central Sonoma County on the north to northern Santa Clara County on the south. Most interestingly, this subspecies appears, in the recent geologic past, to have crossed the Central Valley, which is not a suitable habitat for *Ensatina*, and to have established itself on the lower western foothills of the Sierra Nevada in the range of *Ensatina eschscholtzii platensis*, with which it has begun to interbreed. This remarkable distribution pattern is based by Stebbins on only two locality records: one a possibly reliable sight record from the Berkeley Tuolumne Camp, Tuolumne County; and another a collection from Jawbone Ridge, Tuolumne County, 4.5 miles south-southwest of Jawbone Station (about 12 miles almost due east of Groveland, California, approximately latitude 37°53′ and longitude 120°03′). Another specimen, possibly of this subspecies, taken at Bear Valley, Mariposa County, California, was loaned to Dr. Stebbins by Dr. Sherman C. Bishop.

The above facts explain the interest of a third record of *xanthoptica* in the Sierra foothills some 40 miles north of Stebbins' Jawbone Ridge locality. While exploring a cave in the Upper Sonoran Zone of Calaveras County, California, on May 22, 1949, I collected 2 salamanders that have proved to be *xanthoptica*. These specimens (Stanford Natural History Museum 9579 and 9580), an adult male and a juvenile that appears to be a female, were found in total darkness upon a mud bank about 70 feet from the cave entrance. On returning to the cave on June 9, I could find no more specimens. The cave was still quite damp, though external conditions were much dryer than on the former trip. This locality is approximately 8 miles southeast of San Andreas and is at the site of a former settlement known as Cave City.

Under the date of June 6, 1949, Dr. Stebbins wrote that he has another Sierran record of *xanthoptica*, which he suggested that I mention. Mr. Dixon Clark, of the University of California, collected a subadult 3 miles northeast of Sonora at Wood's Creek, Saw Mill Flat, Tuolumne County, California, on April 23, 1949.

These records further substantiate the occurrence of *xanthoptica* in the Sierras and suggest that its range in this region may be more extensive than hitherto suspected —JOHN W. FUNKHOUSER, *Natural History Museum, Stanford University, California.*

A POSSIBLE HIBERNATING SITE FOR THE SPRING PEEPER.—While digging in a woods near Prospectville, Montgomery County, Pennsylvania, on October 17, 1948, I uncovered a spring peeper, *Hyla c. crucifer*, at a depth of 6 inches. The specimen was so incrusted with earth that if it had not jumped it would have remained undetected. The air temperature was 69° F.

The site at which the frog was collected is covered with a 4-inch layer of leaf mold and is approximately 100 yards from a small pond. At this time the pond was dry but when flooded in the spring it supports a large colony of these frogs. The same afternoon a *crucifer* was heard calling near the pond.

The conditions under which the frog was found indicate that it was either aestivating or preparing to hibernate. It had not reached a sufficient depth to place it below the average frost line (2 feet 6 inches to 3 feet in this area), but the depth of actual freezing below leaf mold requires investigation.—ROBERT G. HUDSON, *2248 Taggert St., Philadelphia 25, Pennsylvania.*

A NEW FLORIDA RECORD FOR *SISTRURUS MILIARIUS BARBOURI*.—According to Gloyd (1940, Chicago Acad. Sci. Spec. Publ. 4), *Sistrurus miliarius barbouri* Gloyd has never been reported from the extreme southwestern portion of the Florida peninsula. This area includes all of Monroe and Collier counties, and a good part of western Dade County where it is bisected by the Tamiami Trail.

On October 23, 1948, about 10:30 P.M., while returning from a collecting trip near

Naples, Collier County, Mr. Albert Schwartz and I stopped on the Tamiami Trail, 20 miles east of Naples, to examine a D.O.R., and then discovered a rattlesnake nearby. It was coiled with its head underneath the mid-body. As I approached, the snake started to make its way into the brush at the side of the road, where it was captured.

Examination proved the snake to be *Sistrurus miliarius barbouri*. The scale formula was 25–23–19. The snake at time of capture had seven rattles. The total length was about 73.5 cm. which, according to Schmidt and Davis (1941, Field Book of Snakes: 289) is above the average length for the species.

The area in which this specimen was captured is very wet and swampy with little dry ground. *Sistrurus miliarius* seems to live mainly in dry country rather than in such a swampy area. For this reason the population of these snakes in this particular locality is probably small. This specimen represents an interesting addition to the herpetological fauna of southwestern Florida, is the first record of the species from Collier County, and was found in an unusual habitat.—WILLIAM P. CATLIN, *821 Wallace St., Coral Gables 34, Florida.*

EXTENSION OF RANGE OF THE WATER-SNAKE *NATRIX TAXISPILOTA*.—It is generally agreed by herpetologists that the southern limits of the range of *Natrix taxispilota* Holbrook is central Florida. Carr (1940, A contribution to the herpetology of Florida, Univ. Fla. Pub., Biol. Sci. Series, 3 (1): 89) cites records from Escambia, Liberty, Alachua, Dixie, Marion, Lake, Hillsborough and Lee counties. The last county mentioned, Lee, is about 100 miles to the northwest of Dade County, which comprises half of the southern tip of Florida. On the night of October 13, 1948, the writer, along with Raymond Porter and William P. Catlin, Jr., both students at the University of Miami, obtained twenty-four specimens of *Natrix taxispilota* one-half mile east of Royal Palm Hammock, on state route 27, Dade County, Florida. These specimens were captured beneath and beside two bridges over sloughs that were flooded with water from recent hurricanes. The snakes had apparently taken refuge near the bridges because of the very swift currents of the flooded area. They ranged in size from young about 1 foot in length to adults, 2½ feet in length. Scale counts and counts of blotches on the dorsum indicate that these snakes are typical *Natrix taxispilota*. Several local herpetologists believe that the snake is never common in Dade County, but state it has been collected here for the past fifteen years; occasionally specimens are found on the Tamiami Trail, usually about 50 miles west of Miami. The presence of the snake in this area can be explained by the flooding of the Lake Okeechobee area and the southern drainage of the flood waters down the peninsula via the Everglades and through Dade County. Such periodic flood and drainage would offer excellent means for dispersal of a snake with aquatic habits such as those of *Natrix taxispilota*. Some local residents indicate that the specimens taken near Royal Palm Hammock have been introduced into this area. However, this does not invalidate the additional records from Dade County along the Tamiami Trail as mentioned above.—ALBERT SCHWARTZ, *Department of Zoology, University of Miami, Coral Gables 34, Florida.*

NARROW-MOUTHED TOAD TAKEN IN IOWA.—The recent examination of several amphibians collected in southeastern Iowa revealed a single specimen of narrow-mouthed toad, *Microhyla carolinensis carolinensis* (Holbrook). The identification was verified by Dr. Reeve M. Bailey, Curator of Fishes, and Dr. Charles F. Walker, Associate Curator of Reptiles, Museum of Zoology, University of Michigan. The specimen was taken May 11, 1946, from the grassy edge of an upland farm pond located in section 9, Salt Creek Township, Davis County. It was collected with a number of cricket frogs, *Acris crepitans blanchardi*. The specimen has been deposited in the Iowa State College collection.

This record appears to represent a substantial northward extension of the range of the species in the Mississippi Valley where it has previously been taken only as far north as St. Louis County, Missouri (Hecht and Matalas, A review of the Middle North American toads of the genus *Microhyla*, 1946). There are no previous records for Iowa. —W. D. KLIMSTRA, *Department of Zoology and Entomology, Iowa State College, Ames, Iowa.*

THE BREEDING AND DEVELOPMENT OF STRECKER'S CHORUS FROG IN CENTRAL TEXAS.—Strecker's chorus frog (*Pseudacris streckeri* Wright and Wright) breeds in central Texas from mid-January until late April. The peak of the breeding apparently occurs from the last week of January through the first week of March. Twenty-three male and 3 female *Pseudacris streckeri* were collected in a rain pool 5 miles north of Austin, Travis County, Texas, on the night of January 23, 1949. The temperature ranged from 52°F. to 56° F; the relative humidity was 100 per cent. The individuals were mated in the laboratory. The resulting eggs were kept in balanced aquaria.

Many egg clusters were observed clinging to twigs and brush in the rain pool when the locality was revisited the following afternoon. Several groups of eggs were collected. The larvae of the laboratory developing eggs and those collected the afternoon of the 24th escaped their membranes on the 30th and 31th of January.

The pool where the frogs and eggs were collected froze on January 27 and remained frozen to a depth of 3–4 inches until February 2. The temperature during this seven-day period ranged from 47°F. to —2°F., with an average of 25.3°F. Several twigs clustered with eggs were collected from this pool on February 3 by Dr. W. F. Blair and the writer. Several tadpoles were observed and 5 were collected. These tadpoles were quite large and were obviously of a much earlier hatching than the egg clusters.

These post-freeze egg clusters were found to be viable and were placed in aquaria in the laboratory. The developing embryos were found to be in a comparable stage of development (about four days) to the original collection at the time of the freeze, which suggests that development in the rain pool had been arrested during the cold weather. These eggs developed and the larvae hatched on the 9th and 10th of February. The egg clusters in the collection pool released their larvae on the 8th and 9th of February.

It is probable that the tadpoles and eggs of *Pseudacris streckeri* normally survive the freezing-over of the waters in which the eggs are laid. It may be assumed that the tadpoles escaped death by burying themselves in the mud and debris in the bottom of the pond. Some of the clusters of eggs were frozen in the laboratory. These eggs did not survive even five minutes of this treatment. Another group of the clusters was placed in a pan and the temperature of the water was reduced to 2°C. and maintained at this level for four hours. The majority of the eggs survived this experience. A third group of egg clusters was placed in water, and parts of the water were frozen. Those eggs that were frozen did not survive. A majority of the others survived.

The tadpoles in the pond had transformed by the 25th of March. The laboratory larvae had not transformed on April 15, when the experiment was discontinued.

Fifty male and 12 female *Pseudacris streckeri* were collected by Mr. Alvin Flury and the writer on February 25, near Luling, Gonzales County, Texas. These were found breeding in large pools ranging from 2 to 4 feet deep. In the same pools were collected individuals of *Scaphiophus holbrookii hurterii* Strecker, *Bufo compactilis* Wiegmann, *Acris crepitans* Baird, *Pseudacris clarki* (Baird), *Rana catesbeiana* Shaw and *Rana pipiens* Schreber. All were apparently breeding.

A calling individual of *Bufo debilis* Girard and the seven above forms were taken in a pool where large numbers of *Pseudacris streckeri* were breeding near Somerset, Bexar County, Texas on February 26. *Ambystoma texanum* (Matthes), *Microhyla olivacea* (Hallowell), and *Pseudacris clarki* were observed on March 18 breeding in the same ponds with *Pseudacris streckeri*.

From the available evidence the writer assumes that the eggs and tadpoles of *Pseudacris streckeri* are capable of surviving heavy freezes if they are not actually frozen. Field observations indicate that those eggs below the ice are capable of surviving.—David L. Jameson, *Department of Zoology, University of Texas, Austin 12, Texas.*

SOUNDS PRODUCED BY THE SUWANNEE TERRAPIN.—At the Reptile Institute there is a large turtle pen which is often filled with Suwannee terrapins (*Pseudemys floridana suwanniensis* Carr). On many occasions I have heard these turtles making grunting sounds. When approached, they would immediately cease vocalizing. However, I was able to watch the reptiles unobserved by them, and noted that the calling turtle was always floating on the surface of the water with head held high. The call is a short, low grunt, deep-throated, and is given with the mouth closed; the neck of the turtle pulsates with each grunt. It seems likely that this vocalizing plays a part in courtship proceedings.—E. Ross Allen, *The Reptile Institute, Silver Springs, Florida.*

ONTOGENETIC CHANGES IN THE COLORATION OF THE SNAKE *CEMOPHORA COCCINEA.*—Specimens of the scarlet snake, *Cemophora coccinea,* change considerably in coloration during their lives, at least in the region between the 1000-foot contour of upper Georgia southward to the tip of the Florida Peninsula. I have collected young and adults at many scattered localities throughout this area and noted a consistent difference in the coloration of adults and young.

In the newly hatched *Cemophora* the back bears a row of scarlet saddles that extend downward on the sides to the second or third scale rows above the ventral plates. The saddles are bordered anteriorly and posteriorly with black, and are separated by clear white interspaces. The white of the venter extends upward on the sides to include one or two scale rows and is also continuous with the white of the dorsal interspaces. Extending the length of the body along the ventrolateral region is an irregular row of black flecks, which form narrow lateral borders to the red saddles, and which tend to form a black spot just above the ventrals at the level of each white interspace. The degree of ventrolateral flecking is subject to considerable individual variation.

Specimens of about 12 inches length begin to show a faint yellowish suffusion in the vertebral portion of each transverse white marking. As the snake grows older the yellow intensifies and spreads laterally. The ventrolateral black flecking is reduced, while the transverse black bands extend farther down on the sides and on to the ventral plates. The red likewise extends laterally, and also becomes richer and deeper. The fully adult scarlet snake is marked with deep red transverse bands that extend upon the tips of the ventrals, and these red bands are bordered with narrower black ones that encroach even farther upon the abdominal scutes. The black-bordered red bands are separated by bright yellow interspaces, the yellow fading into white in the ventrolateral region. Often, but not invariably, there is a black spot on each side, just above the ventrals, at the level of each yellow interspace. The adult scarlet snake, viewed even from the side, appears to be ringed with red, yellow, and black; this is not the case with young examples. In favorable ecological areas the herpetologist may collect a series of large adults that appear to differ from the more familiar (and smaller) specimens generally encountered elsewhere.

In very old specimens there is a general darkening and dulling of the entire pattern, the red becoming a dark red-brown, and the yellow becoming tan or even light gray-brown. The darkening begins in the vertebral region and progresses laterally with age.

Some geographic variation in pattern is evident. In specimens from Georgia there are usually 16 or 17 red bands on the body, while 13 or 14 is usual in Dade County, Florida. In all examples a black band crosses the head just behind the eyes. In Georgia specimens this band is usually straight, while in south Florida ones it forms a wide V, the apex directed backward.—Wilfred T. Neill, *Research Division, Ross Allen's Reptile Institute, Silver Springs, Florida.*

Ichthyological Notes

SYSTEMATIC NOTES ON SOME AMAZONIAN CLUPEID FISHES OF THE GENUS *ILISHA*.—While editing and, in part, revising the sections on clupeid fishes prepared by the late Dr. Samuel F. Hildebrand for the "Fishes of the Western North Atlantic," the writer has reached a few systematic conclusions that appear to necessitate small changes in Dr. Hildebrand's treatment. For these newer results to be published for the first time as part of Dr. Hildebrand's work would either becloud their authorship or result in bothersome footnotes and a dual treatment entirely out of place in a general manual. The best solution seems to be separate publication.

Genus *Ilisha* Richardson

Norman (1923, Ann. Mag. Nat. Hist., (9) 11: 17) segregated a new genus, *Neosteus*, distinguished from *Ilisha* by the presence of a narrow, toothed bone extending from the end of the premaxillary to the middle of the maxillary, and replacing the ligament occupying the same position in *Ilisha*. Fowler (1941, Bull. U.S. Nat. Mus., 100(13): 648) has shown that the generic name *Pellona* Valenciennes, 1847, applies to the group named *Neosteus* by Norman, and must replace the latter.

In Dr. Hildebrand's manuscript account of the Clupeidae for the "Fishes of the Western North Atlantic," he did not recognize the genus *Neosteus* (or *Pellona)*, not, as he says, because he thought the genus invalid, but solely because he was unable to determine from the description to which genus *Ilisha narragansetae* Fowler belongs.

Several years ago, the present writer examined several species of the *Ilisha-Pellona* group. He could not find that the two genera, as understood by Norman, differ significantly except in the presence or absence of the small bone referred to above. Moreover, in one fine large individual from the Amazon Basin, the bone was present on one side and absent on the other. For this reason, the writer does not care to disturb Dr. Hildebrand's sinking of *Neosteus (Pellona)* in the synonymy of *Ilisha*. However, this course is followed with the express notation that further studies may demonstrate the advisability of recognizing one or more segregates of *Ilisha (sensu lato)*, perhaps on a basis different from that employed by Norman.

Recognition of the pertinence to this genus of *Pseudochirocentrodon amazonicum* Miranda Ribeiro and *Ilisha iquitensis* Nakashima (two nominal forms not placed by Dr. Hildebrand), requires some emendations in his nomenclature.

Ilisha amazonica (Miranda Ribeiro)

Pseudochirocentrodon amazonicum Miranda Ribeiro, 1923, Commissão de Linhas Telegraphicas Estrategicas de Matto Grosso ao Amazonas (Rio de Janeiro), Publ. no. 58, ("1920"): 8 (original description; type locality, Manãos, Estado de Amazonas, Brazil; types in Museu Nacional, Rio de Janeiro).

Ilisha iquitensis Nakashima, 1941, Bol. Mus. Hist. Nat. "Javier Prado" (Lima), año 5, no. 16: 66, fig. (original description; type locality, Iquitos, Oriente, Peru; types probably in Museo "Javier Prado," Lima).

Ilisha apapae Hildebrand, 1948, Smithson. Misc. Coll., 110: 3, fig. 2 (original description; type locality, Rio Amazonas between Belém do Pará and Manáos, Brazil; type in U. S. Nat. Mus. no. 52550).

Miranda Ribeiro's genus and species has not been placed by recent authors. Dr. Hildebrand disposed of it in his manuscript in a footnote to the genus *Chirocentrodon*. The present writer has seen the types in the Museu Nacional in Rio de Janeiro and believes them to be specifically identical with Hildebrand's type of *Ilisha apapae*, which he has examined in the U. S. National Museum in Washington.

Miranda Ribeiro evidently decided that his fish represented a new genus upon the basis of the key to clupeid genera in Jordan and Evermann (1896, Bull. U. S. Nat. Mus., 47(1): 418), where *Chirocentrodon* is described as having canine teeth and

Ilisha as having only villiform ones. *P. amazonicum* has the teeth mostly large and strong, as determined by re-examination of the types, and their arrangement is much as described by Miranda Ribeiro. However, some of the teeth of *Ilisha flavipinnis* are just as large, and although it is possible that future work may demonstrate that *Pseudochirocentrodon* deserves subgeneric or generic rank, it seems best at the present time to place it with *Ilisha*. For one thing, the only presently available specimen of the species (the type of *I. apapae)* is in very poor condition with the teeth mostly gone.

Recognition of the identity of *amazonica* and *apapae* makes the writer less dubious in referring to the same species the inadequately described and poorly figured *I. iquitensis* of Nakashima, which had been overlooked by Dr. Hildebrand. The figure is very roughly drawn and does not agree with the description in several particulars, nor does the description impress one with its reliability. Holding this in mind, the apparent difference between *iquitensis* and the type of *apapae*, in dorsal fin position, is probably not as great as it seems. The only other character given by Nakashima that does not fit this species is the anal count. *I. iquitensis* is said to have 52 anal rays, the type of *apapae* has 48, while Miranda Ribeiro gives 47 for *amazonica*. In a fish with as many anal rays, a variation from 47 to 52 does not seem to be excessive. Finally the nuchal color marks of *iquitensis* seem still to be retained very faintly in the type of *apapae*, but it is not possible to determine whether the latter specimen ever possessed the caudal filaments of *iquitensis*.

Ilisha altamazonica (COPE)

Pellona altamazonica Cope, 1872, Proc. Acad. Nat. Sci. Philadelphia: 256 (original description; type locality, Rio. Ambyiacu, Oriente, Peru; type in Philadelphia Academy).
Ilisha deauratus Nakashima, 1941, Bol. Mus. Hist. Nat. "Javier Prado" (Lima), año 5, no. 16: 77, fig. (original description; type locality, environs of Iquitos, Oriente, Peru; type probably in Museo "Javier Prado," Lima).

Dr. Hildebrand had not mentioned Nakashima's nominal species in his manuscript. According to the former's manuscript key and descriptions, *deauratus* agrees rather well with *altamazonica* in everything but the number of ventral scutes, which Nakashima gives as 28 (total). Hildebrand gives 32 or 33 scutes for *altamazonica*. Nakashima's species, if not referred to *altamazonica*, would have to stand as a distinct form differing almost solely in scute number. It is my belief that *deauratus* is identical with *altamazonica*.

Nakashima described several new fishes from Iquitos. He acted for a time as chief of the fishcultural station of Loreto, in Amazonian Peru, previous to the recent war. He had had fishery training in Japan, but evidently little or none in systematic ichthyology. Few of the new fishes he described were valid, and close perusal of his papers indicates almost conclusively that the only work utilized by him in identifying fishes from the Peruvian Amazon was Eigenmann's "Fresh-water Fishes of British Guiana." The result, insofar as his supposed new species are concerned, scarcely need be pointed out.—GEORGE S. MYERS, *Natural History Museum, Stanford, California.*

BROUSSONET'S GOBY FROM THE BRACKISH WATER OF THE LOWER ST. JOHNS RIVER, FLORIDA.—The writer has had the privilege of examining a specimen of the barreto, or Broussonet's goby, *Gobioides broussonetti* Lácepède, in the collections of the Jacksonville Children's Museum. According to Miss Madalene Sawyer, Director of the Museum, the "specimen came in alive at the electric light plant's floating power station, and was picked up at the screening." This seems to be the second record of this typically brackish water species in Florida. The first was of one collected in the Inland Waterway, near Salerno, by Capt. William B. Gray, and described by Henry W. Fowler (1947, Notulae Naturae, No. 197: 1–4). According to J. T. Nichols, of the American Museum of Natural History (personal communication), there is one record of *G. broussonetii* from near New Orleans, in the Jordan, Evermann and Clark Checklist. J. L. Baughman, of the Game, Fish, and Oyster Commission, Rockport, Texas (personal communication), reports that a half dozen of these gobies were collected in 1947 by the Dow Chemical Company, Freeport, Texas.

Although the specimen from the St. Johns River agrees with Fowler's description of the Salerno specimen in most respects, certain differences seem to justify publication of the following data.

Total length 479 mm. Standard length 392 mm. Depth (proportional to standard length) 11. Head 2.6 in distance from snout to vent, 6.8 in standard length; width of head 1.3 in its length. Snout 4.75 in head. Eye 12.6 in head. Interorbital 1.4 in snout. Length of gill cleft 2 in head. Least depth of caudal peduncle 2.9 in head. Length of caudal 2.8 in rest of tail from vent. Length of pectoral 1.6 in head. Length of pelvic 1.4 in head.

Teeth, scales, naked areas, and papillae as in Fowler's description.

If, as indicated by Fowler, the dorsal spines may best be distinguished from the rays by their shorter length, then the count for this specimen is D. VII, 16. The numbers of anal, pectoral and pelvic rays are the same as reported for the Salerno specimen.

Color, in alcohol, is much as described by Fowler. However, this specimen shows dark gray barring on the sides—one bar for each muscle segment from behind the pectoral to about 5 segments behind the anus. The bars are short, extending from the dark dorsal surface only as far as the angle marking the meeting of the epaxial and hypaxial portions of the myomeres. Vague streaks of dark color, much less distinct than the epaxial barring, are to be seen over the hypaxial muscles. Behind the fifth segment posterior to the anus, the barring gives way to vague blotches of color. The areas between the dark markings are probably whitish in life, but have a pinkish buff tint in the preserved specimen, probably due to the flesh showing through the thin skin.—HENRY KRITZLER, *Marine Studios, Inc., Marineland, St. Augustine, Florida.*

A RECORD OF THE SWORDFISH, *XIPHIAS GLADIUS* LINNAEUS, FROM THE TEXAS COAST.—On June 19, 1949, the author learned that the head of a swordfish had been brought into Port Aransas, Texas. Upon investigation, all that could be found was the rostrum, the head having decomposed to such an extent that its finder, Mr. Charles Urschel, Jr., had had the bill cut off and thrown the rest away.

While the author could not reach Mr. Urschel for the complete story, he was informed by Capt. Troy Denton that the swordfish was found on June 17 on Padre Island, approximately 45-50 miles south of Port Aransas. Mr. Urschel had stated that he was driving along the shore and on his return trip he saw the body of the swordfish washing onto the beach. The fish had been very severely bitten about the body and head (one eye was missing) by sharks or porpoises, and was dead. The fact that it was surrounded by a pool of blood was evidence that it had been freshly killed. Mr. Urschel cut off the head and brought it back to Port Aransas. He estimated the total length of the fish to be about 12-14 feet. Capt. Denton said that the eye was almost 3 inches in diameter. He very kindly loaned the rostrum to the author for measurements and more careful study.

The rostrum was 31½ inches long, 3½ inches wide where it had been cut off, and 1¼ inches at the thickest part of the cut. Capt. Denton said that at least 5 inches more of the rostrum was left attached to the head for he had cut it off just beyond the point to which it was covered by flesh. On the left side of the rostrum, 13 inches from the cut, was a dent, 1 inch wide and ¼ of an inch deep, an old wound as shown by the overgrowth of epidermis. Two inches before this large dent was a series of three dents, each 1 inch wide and 1/16 of an inch deep, and each immediately following the other. The right side of the rostrum was straight, from the cut to its tip. This rostrum was compared with another on display at the Port Aransas Boat Basin which was taken from a swordfish caught off Block Island on the Altantic coast. The latter was 33⅞ inches long, 3⅜ inches wide at the cut, and ¾ of an inch at the thickest part of the cut. No figures were available on the length of the fish from which it had been taken.

On June 20, the author traveled south of Port Aransas for a distance of 54 miles, but no sign of the carcass was to be found anywhere along the shore.

This is the first record of *Xiphias gladius* Linnaeus from the western Gulf of Mexico. Other records of this fish from the Gulf of Mexico seem to be rare or lacking.—DAVID KRAMER, *Texas A & M Research Foundation, Port Aransas, Texas.*

Reviews and Comments

GENERAL ACCOUNT OF THE JAPANESE TAILED AMPHIBIA. By Ekio Sato. Japan Publishing Co., Osaka, Japan, 1943: 520 pp., 31 pls. (in color), 149 figs., 87 tables. $30.00 (Japanese).—Mr. Carl Gans of New York city, upon his return to the United States from service in Japan, brought with him a copy of Ekio Sato's account of Japanese salamanders, which had been published during the war. Considering the limitations imposed by war-time conditions, Ekio Sato has produced a sumptuous volume, with many colored plates on a good quality of coated paper.

The book includes a general account of the salamanders and a detailed classification. Under the former such topics are discussed as habitat, distribution, chromosome types, phylogeny and geological history of the Japanese islands. The classification is essentially that of the author's earlier work, "Classification of the Japanese Animals."

The species included are those of Honshu, Shikohu, Kyushu, Hokkaido, Karafuto, Korea, the Ryukyus and Formosa. The sublime confidence with which Korea and Formosa are included as part of Japan is to be noted.

Under the descriptions of individual species the topics are arranged as follows: external morphology, color, skeletal characters, measurements, variation, habitat, eggs and embryology. The accounts vary in completeness as knowledge of certain forms is scanty.

Many of the figures were drawn by the author but the plates in color are credited to Mr. Yoshioka.

The species recognized as valid by Sato are: *Hynobius leechii, H. nebulosus, H. tokyoensis, H. dunni, H. tsuensis, H. formosanus, H. lichenatus, H. nigrescens, H. sadoensis, H. abei, H. retardatus, H. okiensis, H. naevius, H. kimurai, H. stejnegeri, H. sononi, Pachypalaminus boulengeri, Salamandrella keyserlingii, Onychodactylus japonicus, O. fischeri, Megalobatrachus japonicus, Tylotriton andersoni, Triturus pyrrhogaster* and *T. ensicauda.*

The bibliography includes references to 284 publications. Technical terms and Japanese names are indexed.

It is my understanding that this work was to have been printed in English but extreme nationalism, engendered by war, brought about a resetting in Japanese characters.

I am indebted to my friend, Dr. Masuo Kodani, for preparing an abstract in English.—Sherman C. Bishop, *Department of Zoology, University of Rochester, Rochester, New York.*

CHECK LIST OF THE FLORIDA GAME AND COMMERCIAL MARINE FISHES INCLUDING THOSE OF THE GULF OF MEXICO AND THE WEST INDIES, WITH APPROVED COMMON NAMES. By Luis Rene Rivas. State of Florida. Bd. of Conservation Educational Series No. 4: 39 pp. 1949.—A check list of 216 species of marine food and game fishes of the region (not including elasmobranchs), arranged phylogenetically by families, with scientific name and authority, preferred common name, other common names frequently used, and a terse statement of geographical range. An alphabetical index to the common and scientific names is included. There is generally good agreement in usage of both common and scientific names with the list of fish names put out in 1948 by a special committee of the American Fisheries Society (see Copeia, 1948 (3): 232), and with the "Standard Check List of Common Names for Principal American Sport Fishes" compiled by the Outdoor Writers Association of America, July 7, 1948 (and available, free of charge, from their office at 10 E. Lexington St., Baltimore 2, Maryland); but there are a few differences. The author does not mention the Outdoor Writers list.—Gerald P. Cooper, *University Museums Annex, Ann Arbor, Michigan.*

A CLASSIFICATION OF THE FISHES OF THE FAMILY MYCTOPHIDAE. By A. Fraser-Brunner. Proc. Zool. Soc., 118: 1019–1106, 1 pl., 14 text figs., London, 1949.—It was not until 1892, when Lütken published what may be considered as the first modern revision of the family Myctophidae, that the systematic importance of the photophore arrangement in these fishes was recognized. Unfortunately, these organs proved to be so valuable that they have been over-emphasized at the expense of other characters by practically every subsequent worker. Fraser-Brunner's major contribution is that, while recognizing the value of the photophore patterns, he has re-emphasized the importance of such features as teeth, gill rakers, position of fins, lateral lines, etc., and, by carefully evaluating all of these characters, he has established a logical and balanced classification which, in general outline, should endure for a long time. Conservatives who have been accustomed to thinking of the subfamily Myctophinae as comprising only four genera may be shocked to find these fishes allocated to more than 30 genera and subgenera. However, the subdivision of the classical genera is definitely not based upon the caprice which so often seems to have influenced splitting in other works. The significance of the characters upon which the genera are based has been carefully investigated and evaluated. Thanks to Fraser-Brunner, the interrelationships of the Myctophidae are much clearer than heretofore.

I wish that I could be as enthusiastic about the specific keys in this work as about the generic revision and the general introduction. Unfortunately, this is not the case, and I fear that users of the keys will often be led into error or doubt. Too often the same species is listed under two separate names while other perfectly distinct species have been buried in synonymy. It should, in all fairness, be pointed out that the fault lies not so much with Fraser-Brunner as with the inadequacy of his material and his too great faith in the descriptions and figures presented by his predecessors. He simply accepted as fact the numerous careless errors and inaccuracies of others, which are the shame of the "science" of ichthyology. Until the general standards have been elevated, the definitive revision of the Myctophidae can not be written. For the present, Fraser-Brunner's work will form the indispensable tool for ichthyologists investigating this difficult family, but it should always be supplemented by more detailed works on the lantern fishes of the local areas under study.—ROLF L. BOLIN, *Hopkins Marine Station, Pacific Grove, California.*

NORTH AMERICAN FRESH WATER SPORT FISH. By Lou S. Caine. A. S. Barnes and Company, New York, 1949; pp. xii + 212, 47 halftones of fish and fishing tackle and 7 color plates of fish plus a color frontispiece of the brook trout by Wm. J. Schaldach. With biological notes by Karl F. Lagler and a foreword by J. Hammond Brown. $5.00.—This book is properly placed by the publishers in *The Sportsman's Library* series, for it is essentially a reference book for anglers. First there is a sequence of short essays on fish biology and management. Following this the bulk of the book is devoted to accounts of families and species of the principal sport fishes of North American fresh waters. The final 35 pages are devoted to a discussion of fishing tackle and its use.

Twelve fish families, including those of the sunfish, trout, grayling, pike, perch, sea bass and drum, and under them some 50 species, are treated in detail. For each species the account includes comments about angling characteristics, a list of colloquial names, characters for specific identification with special emphasis on color pattern, range, habitat preferences, record and average sizes, eating qualities, feeding habits, and effective methods of angling. The biological notes section under each species covers spawning seasons, nesting habits, growth rate, feeding habits, problems of parasites, and other matters of special interest.

The illustrations are good. The text is informative and generally quite free of errors, although there are enough of the latter, and of mistakes in spelling, to be annoying to a critical reader. In the remarks on *natural foods* there is rather consistent redundancy and confusion in listing types of insects in the diets, e.g., "insects mainly, and also midges, larvae," etc., or "larvae, midges, flies, and insects." Other such irregularities will be overlooked by most sportsmen. Although the text is not documented, it is obvious that the authors have drawn extensively on the recent literature. The book is recommended highly.—GERALD P. COOPER, *University Museums Annex, Ann Arbor, Michigan.*

THE FISHERY OF TUNG TING LAKE. By Ti Chow. Canton Fish Market (at the corner of Pearl Bridge), Canton City, China, Publication No. 1: 22 pp., 21 figs., 4 tables (added paging at end of text), 1948.—Tung Ting Lake is the largest lake in central China. It is really an overflow from the Yangtze River. During the war this district was relied upon for food supply, and the Japanese occupied a part of the lake and at times made an attempt to capture its whole extent and the very fertile territory surrounding it.

Mr. Ti Chow describes the thirty species which have been found in these waters, mostly Cyprinidae and Siluridae. He gives figure illustrations of some of these, and also statistics as to their catch and value. The most interesting part to the casual reader is his description of the methods used. Of these he describes some fifteen. Some of them are extremely interesting and might be quoted here.

Bull rushes are planted for the purpose of attracting fish. As many as 8 to 15 thousand bundles are planted in an area of 4 to 6 acres in quiet water about 5 feet deep. The greatest concentration of plants is in the center of the area. This requires 3 days of labor for a crew of 30 people. This crew will plant from 8 to 10 such plots, requiring about a month, and then return to fish the first plot so planted. The area is surrounded with a bamboo screen fence and sub-divided into sections. The bull rushes are then removed from a section and the fish caught in traps. The traps are placed in the corners and the fish driven into them by the fishermen, using a rake-like implement. Some fish are caught on the prongs of the spear. The trap has a circular mouth and a cone-shaped throat made of bamboo. As the fish are driven into the throat they make their way to the apex of the cone, forcing open the bamboo. After passing through the apex of the cone, the bamboo springs back into place and the fish are trapped. The outside sections are fished first, then the center in which the largest catch is made.

The foot fishery is used by poor fishermen who cannot buy gear. The amount of fish caught depends upon technique. Some fishermen make very good catches by this method and so it is quite popular. The fishery is carried on in winter time when the water is very cold and fish seek refuge in holes on the bottom of the lake. The fisherman first walks in the mud in about 3 or 4 feet of water, making as large footprints as possible. He is able to remain in the water at one time long enough to make perhaps 100 or more footprints, depending upon how well he can stand the cold water. The location of footprints is well marked so that the fisherman can return to the same spot in a day or two. He then follows in the same footsteps, and if there is a fish there he steps on it, holding it in the mud until he can reach down and catch it with a gaff hook. Because the water is so cold, the strongest fisherman can work only ½ to 1 hour before he has to come out of the water and warm his body over a hot fire.

The hand fishery is a slight variation of the foot fishery. A trench is dug in shallow water with a stick that is attached to the boat. The stick has a plate on it so that it will dig a trench of uniform depth. A day or two later the fishermen return, and, while one rows the boat, another leans over the side so that his hand drags through the trench and scoops up the fish.

Since the Canton Fish Market is unlikely to have produced papers which are available in many libraries of the United States, these notes may prove of interest. Mr. Ti Chow, the author, is now director of the Kwangtung and Hoinan Fishery Administrative Bureau under the Ministry of Agriculture and Forestry.—W. F. THOMPSON, *Fisheries Research Institute, University of Washington, Seattle 5, Washington.*

FISHES OF THE GREAT LAKES REGION. By Carl L. Hubbs and Karl F. Lagler.—Of this best of all regional fish-identification manuals (reviewed by G. S. Myers in COPEIA, 1948: No. 2, June 30) the Cranbrook Institute of Science, Bloomfield Hills, Michigan, issued a verbatim reprint in 1949. The chief difference from the 1947 printing is the more opaque and less porous paper, which makes the printing clearer and more readable. There are also a few corrections of errors, as in the legend of figure 42, which is of *Perca*, not *Stizostedion*.

EDITORIAL NOTES AND NEWS

Arthur W. Henn

FOR more than twenty years DR. ARTHUR W. HENN has served our Society devotedly and loyally. We were a small and somewhat impecunious group when he became Treasurer, and our present sound financial status is largely due to his diligence and wise foresight. One of his last services, before his retirement on January 1, was the incorporation of the Society, thereby safeguarding our funds and making easier the task of future treasurers. We are grateful.

Incorporation of the ASIH

AFTER an existence of thirty-two years as "an unincorporated association," on November 22, 1949, our organization became "The American Society of Ichthyologists and Herpetologists, Incorporated," under the laws of the District of Columbia. This locality was chosen because it is the seat of our national capitol, which is central and should be satisfactory to everyone, and also because of the remarkable facility under which corporations may be organized there.

The Executive Committee of the Society, required by law to be designated, which will function until the next annual meeting, was set up to include all present officers of the Society and of the Western Division of the Society, the three present Editors of COPEIA, and all Past Presidents of the Society during the past decade. It does not supplant the existing Board of Governors.

At the next annual meeting of the Society, a Constitution and a set of By-Laws will have to be adopted to govern the transaction of business and the conduct of the affairs of the Society in the future.

Any future fundamental changes in the objects of the Society, or its dissolution and assignment of assets, must be effectuated by recourse to the District Court of the United States for the District of Columbia.

For the sake of the record, a full transcription of the proceedings follows. In addition to those persons who acknowledged their participation in the incorporation of the Society before MR. THOMAS CLARK of the Smithonian Institution, whose names follow, the Society is indebted to DR. LOGAN J. BENNETT, of the U. S. Fish and Wildlife Service. As President of The Wildlife Society, he initiated the incorporation of that Society in the District of Columbia in 1948 and from his experience gave the necessary information which facilitated our own incorporation. The record follows:

RECORDER OF DEEDS
WASHINGTON
DISTRICT OF COLUMBIA

THIS IS TO CERTIFY that the pages attached hereto constitute a full, true, and complete copy of a CERTIFICATE OF INCORPORATION OF, "THE AMERICAN SOCIETY OF ICHTHYOLOGISTS AND HERPETOLOGISTS, INCORPORATED," DATED ON THE 22nd DAY OF NOVEMBER, 1949, AND RECORDED ON THE 22nd DAY OF NOVEMBER, 1949, AT 3.21 P.M. as the same appears of record in this office.

IN TESTIMONY WHEREOF, I have hereunto set my hand and caused the seal of this office to be affixed, this the 23rd day of November A. D. 1949.

Marshall L. Shepard,
Recorder of Deeds, D. C.
By *Eleanor Dague Williams* (Signature)
Deputy Recorder of Deeds.

No. 33857
CERTIFICATE OF INCORPORATION
of
THE AMERICAN SOCIETY OF ICHTHYOLOGISTS
AND HERPETOLOGISTS, INCORPORATED

WE, THE UNDERSIGNED, all citizens of the United States and a majority citizens and residents of the District of Columbia, desiring to associate ourselves as a corporation pursuant to the provisions of Chapter 6 of Title 29 of the District of Columbia Code of Laws (1949), do hereby certify as follows:

First. The name or title by which this corporation shall be known in law shall be The American Society of Ichthyologists and Herpetologists, Incorporated.

(a) The permanent address of the corporation shall be "In care of the Smithsonian Institution, Washington, D. C."

Second. The term for which it is organized shall be perpetual.

Third. The particular business and objects of said corporation shall be:

(a) The increase and diffusion of knowledge of all kinds concerning fishes (ichthyology) and reptiles and amphibians (herpetology), these groups of aimals being collectively known as cold-blooded vertebrates; and the increase and diffusion of knowledge concerning other natural objects related thereto;

(b) The issuance of such publications as may be necessary to effect these purposes;

(c) The establishment of professional solidarity and the protection of the interests of its members.

These objects are served by annual meetings, regional meetings, correspondence between members, and publication of the quarterly journal, "Copeia."

The corporation shall function as an educational and scientific society. It shall be a non-profit corporation and without capital stock.

Fourth. The number of its trustees, directors, or managers for the first year of its existence as a corporation shall be fifteen. The names and addresses of the members of the Council or Executive Committee until its next annual election are:

Fred R. Cagle—Tulane University, New Orleans, Louisiana
Gerald P. Cooper—Institute for Fisheries Research, Ann Arbor, Michigan
Anita E. Daughtery—California State Fisheries Laboratory, Terminal Island, California
John R. Dymond—University of Toronto, Toronto 5, Ontario, Canada
Helen T. Gaige—1211 Ferdon Road, Ann Arbor, Michigan
Ross Hardy—Orange-Los Angeles State College, 5400 East Anaheim St., Long Beach 4, California
John L. Hart—Pacific Biological Station, Nanaimo, British Columbia, Canada
Carl L. Hubbs—Scripps Institution of Oceanography, La Jolla, California
George S. Myers—Natural History Museum, Stanford University, California
M. Graham Netting—Carnegie Museum, Pittsburgh 13, Pennsylvania
John Treadwell Nichols—American Museum of Natural History, New York 24, New York
Edward C. Raney—Fernow Hall, Cornell University, Ithaca, New York
Karl P. Schmidt—Chicago Natural History Museum, Chicago, Illinois
F. H. Stoye—Box 109, La Jolla, California
Dwight A. Webster—Fernow Hall, Cornell University, Ithaca, New York

IN TESTIMONY WHEREOF, we have this 22nd day of November, 1949, hereunto set our hands and seal.

A. Remington Kellogg
Leonard P. Schultz
Isaac Ginsburg
William T. Leapley
Arthur W. Henn

DISTRICT OF COLUMBIA, SS:

I, Thomas F. Clark, a Notary Public in and for the District of Columbia, do hereby certify that A. Remington Kellogg, Leonard P. Schultz, Isaac Ginsburg, William T. Leapley and Arthur W. Henn, parties to a certain Certificate of Incorporation bearing date on the 22nd day of November 1949, and hereto annexed, personally appeared before me in said District, the said (same five signers) . . . being personally well known to me as the persons who executed the said Certificate of Incorporation, and severally acknowledged the same to be their act and deed.

Given under my hand and seal this 22nd day of November 1949.

(S) *Thomas F. Clark*
Notary Public

My Commission expires July 31, 1951.

ARTHUR W. HENN.

Research Grants

DR. EDWARD C. RANEY has received an A. A. A. S. Research Grant, awarded by the Washington Academy of Science, of $150 to aid in studying the distribution of fishes in Virginia.

ROYAL D. SUTTKUS, one of Dr. Raney's students, has received Grant No. 5 from the COPEIA Revolving Research Fund in the amount of $60. Mr. Suttkus has a doctoral problem on taxonomy of some of the *Notropis*, and the grant was to be used for travel expenses on a field collecting trip to parts of Alabama, Georgia and Florida, beginning in December, 1949.

ARTHUR S. LOCKLEY, of the Biology Department, University of Oregon at Eugene, has received a University Research Grant for an experimental-ecological study of environmental factors in relation to certain Oregon fishes and other cold-blooded vertebrates.

Einar Lönnberg

DR. EINAR LÖNNBERG, distinguished Swedish vertebrate zoologist, of the Naturhistoriska Riksmuseum of Stockholm, has died. He worked in various fields of zoology, but particularly in ichthyology. His early work was largely on Swedish fishes, but included one significant paper on fishes that he observed and collected in southern Florida. He also published reports on collections from various parts of the world, including the Antarctic. One of his most useful papers gives the result of his re-examination of the Linnaean type specimens of fishes, amphibians, reptiles, and birds. His more recent researches included numerous papers on the amount of carotenoid pigments in various animals. (By CARL L. HUBBS.)

Thaddeus Surber

ICHTHYOLOGISTS, mammalogists and others regret the passing of THADDEUS SURBER, long-time biologist with the Minnesota Department of Conservation, who died on October 8, 1949. Born in West Virginia on February 19, 1871, after some varied assignments in field biology he soon adopted the State of Minnesota. Among his writings, most noteworthy are his "Mammals of Minnesota" and (with Dr. Samuel Eddy) "Northern Fishes" which is the "fishes of Minnesota."

Mr. Surber had been ill for two or three years, including a spine injury. The latter resulted from a fall while carrying a heavy packsack in the woods. He also suffered from recurrence of malaria, originally contracted while collecting in Florida.

News Notes

MR. STEWART SPRINGER has resigned from Shark Industries, Division of the Borden Company, Stuart, Florida, effective December 31. He has accepted an appointment with the U. S. Department of Interior, Fish and Wildlife Service, Branch of Commercial Fisheries. He will work as a fishery engineer, under MR. H. E. CROWTHER, head of the Fisheries Exploration Section. His first assignment is aboard the vessel *Oregon* on the Gulf of Mexico, his address being Pascagoula, Mississippi.

Effective January 10, 1950, DR. JAMES W. MOFFETT entered on duty as Chief of the U. S. Fish and Wildlife Service's Great Lakes Fishery Investigations in Ann Arbor, Michigan. Dr. Moffett replaces DR. JOHN VAN OOSTEN who has been relieved of administrative duties in order to complete many of his outstanding researches on Great Lakes fisheries. Prior to his transfer to Ann Arbor, Dr. Moffett was in charge of the Central Valley Investigations of the Service headquarters at Stanford University, California.

MR. A. C. V. VAN BEMMEL, of Buitenzorg, Java, reports the death of C. O. J. DE HAAS, who was killed with his wife in a motor accident, September 25, 1949, near Garut, Java. Dr. De Haas had just completed a new *Handlist of Indo-Australian Snakes.*

MR. VERNON C. APPLEGATE, Fishery Research Biologist with the Institute for Fisheries Research, Michigan Department of Conservation, at Ann Arbor, Michigan, has accepted an appointment with the U. S. Fish and Wildlife Service as Biologist in charge of the biological and control sections of the sea lamprey studies recently undertaken by the U. S. Fish and Wildlife Service as part of its expanded Great Lakes Fishery Investigations. Mr. Applegate has studied the sea lamprey under sponsorship of the State of Michigan for several years and is one of the outstanding authorities in this field. He entered on duty with the Fish and Wildlife Service on January 16, 1950, and for the present, will be headquartered at Ann Arbor.

DR. WALTER E. HOWARD moved his office during January from the San Joaquin Experimental Range, O'Neals, California, to the Division of Zoology, University of California, Davis. Dr. Howard will continue to supervise the wildlife investigations at the Experimental Range. MR. JAY C. QUAST, the recipient of a graduate student assistantship, will be the resident biologist during the spring semester. Anyone seeking an opportunity for field experience at the San Joaquin Experimental Range during 1950-51, should apply now. Housing is provided.

DR. WILLIS KING resigned from the Wildlife Resources Commission, State of North Carolina, effective September 15, 1949, to become Chief of the Fish Section, Tennessee Game and Fish Commission, at Nashville. The activities of his section include all phases of fish managment and fisheries research.

CLARK HUBBS was appointed Instructor of Zoology at the University of Texas, Austin, Texas, on September 15, 1949. He will develop fisheries work in connection with a program of expansion in natural history studies at the University.

DR. CURTIS L. NEWCOMBE resigned as Zoologist of the Cranbrook Institute of Science, Bloomfield Hills, Michigan, in September, 1949. He is now Biologist of the California and Great Basin Drainage Basins Area, U. S. Public Health Service, with office at 819 U. S. Appraisers Building, 630 Sansome St., San Francisco 11, California.

DR. B. S. KAUSHIVA, formerly Professor of Zoology at the D. A. V. College, Kanpur, has been appointed Assistant Fisheries Development Officer, Provincial Government, Lucknow. Dr. Kaushiva's new address is: Dr. B. S. Kaushiva, Assistant Fisheries Development Officer, Lucknow, U. P.

DR. ALFRED PFRLMUTTER resigned from the U. S. Fish and Wildlife Service, on November 10, 1949, to enter private business.

DR. OSGOOD R. SMITH, Fishery Research Biologist, U. S. Department of the Interior, Fish and Wildlife Service, was transferred in April, 1949 from Stanford, California, where he was working with the South Pacific Investigations on pilchards, to Newburyport, Massachusetts (13 State Street) where he is in charge of one of the field offices on Clam Investigations and working on the biology and production of *Mya arenaria*.

DR. ARCHIE F. CARR, on leave for the past four years to teach biology in the Escuela Agricola Panamericana, Tegucigalpa, Honduras, has rejoined the staff of the University of Florida Department of Zoology, at Gainesville.

Request

THE "ALTE AKADEMIE" in Munich, in which the zoological collections of the Zoologische Staatssammlung were housed, was completely destroyed by bombing during World War II. A large share of the collections was evacuated in time, but a final direct hit, only a few days before the war's end, caved in the vaulted cellar in which the identified and catalogued collections of amphibians and reptiles were stored. Much of this collection, with a number of important types, was destroyed.

The collections are now housed temporarily in the Nymphenburger Schloss in Munich, and are in sufficient order to make possible the resumption of scientific work. PROFESSOR DR. LORENZ MÜLLER, who has retired with the status of Konservator Emeritus, continues to work actively in the Division, which is in charge of the writer. The renewal of studies is made difficult by the destruction of a large part of the herpetological pamphlet collection. Dr. Müller lost not only his house, but his entire library with it.

The undersigned would be greatly obliged to all North American colleagues who may be able to help us to build up the library of the Herpetological Division. We should be especially grateful for any older works that can be spared for us and shall be glad to exchange such papers of our own as are still available. We are also eager to resume exchanges of identified material with American museums. Please address: DR. WALTER HELLMICH, *Konservator, Zoologische Sammlung des Bayerischen Staates, Herpetologische Abteilung, Menzingerstrasse 67, München 38, Germany.*

Correction

IN the article by John W. Crenshaw, Jr. and George B. Rabb in COPEIA, No. 3, September 15, 1949, page 226, the third paragraph should read as follows:

Brimley (1910, Proc. Biol. Soc. Wash., 23: 9–18) reports a single example of *Graptemys pulchra* from Mimmsville, Baker County, Georgia. Dr. Archie F. Carr has suggested in a personal communication that this specimen was very likely *Graptemys barbouri*. Insofar as we have been able to determine, the Brimley specimen is not in existence at the present time.

A S I H Next Meeting

THE next annual meeting of our society is to be held in Salt Lake City, on June 20, 21, and 22, in conjunction with the meetings of the Pacific Division of the American Association for the Advancement of Science. Tentative plans call for two days in formal session and one day devoted to a field trip. DR. A. M. WOODBURY is to be Local Chairman. Conveniently to persons attending these meetings, the American Society of Mammalogists are to convene at Mammoth Hot Springs, Yellowstone National Park on June 25 to 28.

Mailing Dates for Copeia, 1949

COPEIA for 1949 was entered as second class matter in the United States Post Office, Ann Arbor, Michigan, on the following dates, according to records supplied by the Ann Arbor Press: No. 1, April 26, 1949; No. 2, June 30; No. 3, September 21; and No. 4, December 15, 1949.

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Original contributions, not to be published elsewhere, are alone acceptable.

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Figures, author's corrections, expensive tabular matter and unusually long articles may be charged in whole or in part to the author, at the discretion of the Editors.

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